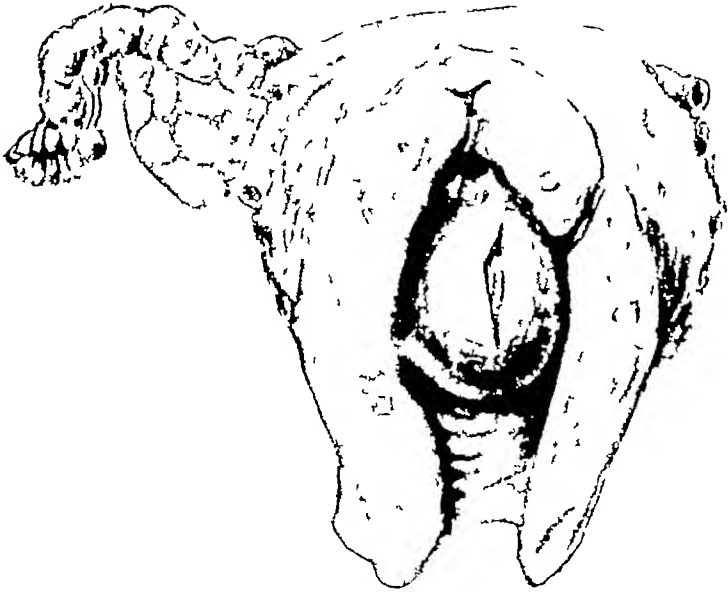


FIG 1



Chorio-epithelioma of the uterus

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FIG 2



Spindle-cell sarcoma of the ovary Acute torsion of the pedicle with hemorrhagic infiltration of the tube

[Page 187]

INTERNATIONAL CLINICS

A QUARTERLY

OF

ILLUSTRATED CLINICAL LECTURES AND
ESPECIALLY PREPARED ORIGINAL ARTICLES

ON

TREATMENT, MEDICINE, SURGERY, NEUROLOGY, PÆDIAT-
RICS, OBSTETRICS, GYNÆCOLOGY, ORTHOPÆDICS,
PATHOLOGY, DERMATOLOGY, OPHTHALMOLOGY,
OTOLOGY, RHINOLOGY, LARYNGOLOGY,
HYGIENE, AND OTHER TOPICS OF INTEREST
TO STUDENTS AND PRACTITIONERS
BY LEADING MEMBERS OF THE MEDICAL PROFESSION
THROUGHOUT THE WORLD

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VOLUME I THIRTY-SEVENTH SERIES, 1927

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Professor Barker's Medical Clinics

DIABETES MELLITUS WITH SEVERE ACIDOSIS (PRE-COMA) IN A PATIENT MANIFESTING ALSO ACTIVE PULMONARY TUBERCULOSIS AND A STAPHYLOCOCCIC EMPYEMA, COMMENTS UPON THE RADICAL ALTERATION IN THE IDEAS OF MANAGEMENT OF DIABETIC PATIENTS SINCE THE DISCOVERY OF INSULIN AND UPON RECENT DEVELOPMENTS IN ATTEMPTS AT EXPLANATION OF THE METABOLIC DISTURBANCES IN DIABETES *

SINCE the discovery of insulin by Banting in 1921 and its introduction as a substitution therapy in the management of patients suffering from diabetes mellitus, physicians have been able to approach the problem of the management of diabetic patients with renewed courage and with justifiable expectation of achieving results that were entirely impossible in the pre-insulin era. A combination of insulin therapy with dieto-therapy in diabetes mellitus represents one of the greatest steps forward in practical therapy made in our time. Formerly, the severer forms of diabetes could not be effectively treated. They were doomed to die. Particularly was this true of patients suffering from so-called "total" diabetes, in which the power of utilizing carbohydrate in the body metabolism was entirely lost. Children suffering from diabetes were objects of especially unfavorable prognosis, in most of them the disease progressed to total diabetes, to diabetic coma and to death. In adults, patients in the pre-comatose stage or in early coma might sometimes be saved, but when the coma had lasted long, there was no hope. To-day, the outlook is in every respect more favorable. Even the severer forms of diabetes, with total loss of carbohydrate utilization-power, cannot

* Clinic for physicians at the University of Maryland by Lowellys F. Barker, M.D., Emeritus Professor of Medicine, Johns Hopkins Medical School and President-elect of the Interstate Post-graduate Assemblies of North American Physicians, Baltimore. Revised from stenographic notes made by Miss Mary E. Reik.

only be kept alive, but can often be kept well enough to lead a fairly active life. The symptoms of acidosis are now much more quickly recognized than before and relatively fewer patients are permitted to enter a pre-comatose or comatose stage, and even when through some accident, coma has developed, the patient can as a rule by early insulin treatment be restored.

Along with these great advances new problems have arisen to which new answers are being supplied by the unceasing activity of research workers in the clinics and in the experimental laboratories. There are many problems, however, that are not yet settled and undoubtedly as knowledge progresses ever new problems will be formulated that will stimulate us to further research.

I consider it fortunate that, at this clinic, I am able to present to you a patient, from the Medical Service of the Mercy Hospital (service of Professor Pincoffs), who illustrates well a number of problems in diabetic management. In the discussion of these, I shall have opportunity to call your attention to some of the more important ideas that are at the moment entertained by active workers in the field of diabetes mellitus. I shall, of course, make no attempt to review in detail the historical development of these ideas in the brief time at our disposal this afternoon. I shall lay most stress upon the ideas that determine the practical management of diabetic cases at the present moment, referring to the theories of the diabetic disturbances of metabolism only insofar as they have a bearing upon our practice.

The patient, John D., a white male, aged thirty seven, a foreman in a packing house until incapacitated by his illness, was admitted to the Mercy Hospital (service of Professor Pincoffs) on October 26, 1926, complaining of weakness, drowsiness, dimness of vision and the passage of large quantities of urine both by day and by night.

His *past history* is negative except for a fracture of the left arm in childhood and for the fact that he admits that he has always been a liberal eater, so that before the onset of his present illness, he was obese. At the age of twenty he weighed 200 pounds.

In his *family history*, it was noted that his father died at fifty four of dropsy, his mother is living and well. One sister died at nineteen of diabetes mellitus, but four brothers and two sisters are living and well. He is married and has seven children living and well, though a number of children died in infancy. There is no history of tuberculosis, malignant disease, rheumatic fever or nervous disease in his family.

The onset of the *present illness* is dated back seven months. While at work

in Virginia, he noticed that he was passing much urine and that he felt very weak. An examination of the urine revealed the presence of sugar and he returned to Baltimore for treatment. His physician placed him upon a restricted diet (cutting out sweets) and gave him "hypodermic injections." After some three weeks, he returned to work though he still felt weak. During the next five months he continued at work, but lost fifteen pounds in weight. Two months ago, he was compelled to give up his occupation and since then has grown progressively worse. He asserts that in the last eight weeks he has lost thirty five pounds more and that he is now fifty pounds below his earlier weight of 185 pounds. He was astonished at the loss of weight because he states that he ate as much food as usual, always having a good appetite. He was also thirsty and drank much water, so that he passed large quantities of urine both during the day and at night, rising at night some twelve times to empty his bladder.

Six weeks before admission he began to have pain in the left lower chest. His physician told him that he had "pleurisy and pulmonary congestion" and advised rest in bed. Later on, the pain subsided. Three days before admission he vomited, but thought that the vomiting was explained by medicine given him by his physician. With his recent illness he had a cough, though he did not seem to lay much stress upon it. He admits, however, that occasionally he coughed up blood-streaked sputum. Three months ago he suffered from night sweats, and as his weakness increased he became more nervous. He has been constipated and has resorted to salines in the morning to overcome the bowel sluggishness. Recently his vision has been blurred and he has seen "spots before his eyes."

Physical examinations made after admission by Doctors Turner, Hartman, Peters and Pincoffs showed a moderately emaciated man who was drowsy and sluggish, but who coöperated with his physicians, he answered questions intelligently when aroused, though his speech was thick. A slight unproductive cough was noticeable and there was a marked fruity odor to the breath. The skin was dry and scaly and "loose" from lack of turgor. There was no œdema. The temperature was normal or subnormal in the morning and rose to 102° in the evening. The pulse-rate was 112, there were twenty-eight to thirty two respirations per minute and they were deeper than normal. The blood pressure was 100 systolic, 70 diastolic.

The pupils were small and somewhat sluggish to light, though they reacted both to light and on accommodation. Examination of the eyegrounds revealed no changes that could account for the amblyopia (confirmed also later by Dr. Harry Friedenwald). Despite the deepened breathing, there was no cyanosis of the lips. The tongue was large, red and fissured. The teeth looked suspicious. There were palpable glands in the retrocervical regions on both sides. The thyroid showed no abnormality.

On inspection of the chest, there was distinct bulging of the left side, especially below, and there was diminished expansion on inspiration throughout the whole left side. There was moderate dullness over the left upper lobe and moist râles were audible there on inspiration. There was an increase of the voice sounds. From the left third intercostal space in front downwards and in the lower part of the back and axilla there was flatness on percussion, absence of vocal fremitus and distant voice and breath sounds.

The heart dulness was displaced somewhat to the right and a to and fro friction rub was audible over the base of the heart. It disappeared at the end of inspiration and was regarded as a pleuro pericardial friction rub. There were no heart murmurs. The pulse was regular in force and rhythm. Aside from a slight epigastric tenderness, the examination of the abdomen and pelvis revealed nothing abnormal. Genitalia and rectum, negative. Extremities negative except for signs of old fracture of the left arm. The knee jerks and ankle-jerks could not be elicited, but the Babinski and Kernig signs were negative. There was no paralysis, and no sensory disturbances could be made out.

DIAGNOSIS AND PRELIMINARY MANAGEMENT

On account of the characteristic history of polyphagia, polydipsia, polyuria, and nycturia in association with a history of glycosuria and because of the fruity odor of the breath, the weakness, the mental torpor and the epigastric tenderness and vomiting, it seemed almost certain that the patient was suffering from diabetes mellitus with severe acidosis (pre-comatose stage). The findings in the left chest showed clearly that there were accompanying pleuropulmonary lesions on the left side. It was obvious that, if the surmises were correct, the patient was in urgent need of vigorous therapy to combat the acidosis. The urine was examined at once and was found to contain 5 per cent of sugar (which usually means a daily output of from 250 to 300 grams of sugar daily in the urine) and to yield a strongly positive reaction for diacetic acid. A blood-sugar determination was also made at once and revealed the presence, instead of the normal 100 mg., of 512 milligrams per cent glucose—a high grade of hyperglycæmia. The carbon dioxide tension of the blood was found to be reduced to 20.8—about half the findings in a normal person.

These results of laboratory tests, promptly acquired, fully justified the fear of impending *coma diabeticum* and vigorous measures were immediately undertaken to combat the acidosis and hyperglycæmia. The patient was placed on a starvation régime, liquids were forced, thirty grains of sodium bicarbonate given every three hours for eight doses, the colon was irrigated and the extremities were surrounded by hot-water bottles. At 3.35 P.M., 25 units of insulin were administered subcutaneously, at 6 P.M., 50 units more, at 9 P.M., 40 units more and at midnight, 25 units more—140 units in all. The next morning the urine was free from sugar, the ferric chloride test for diacetic acid was negative and examination of the

blood-sugar content revealed a marked hypoglycæmia, the blood-sugar having been reduced to 64 milligrams per hundred c c

Charts of the fluid intake and urinary output were kept and quantitative twelve-hour urine examinations were ordered. With the increased amount of fluid injected, the specific gravity of the urine fell from 1030 to 1003 and the patient's general condition rapidly improved.

On the day following admission, because of the hypoglycæmia produced by the insulin, the patient was given a diet of 920 calories content (30 grams protein, 30 grams carbohydrate and 75 grams fat) and during this day 5.6 grams of sugar were excreted in the urine. On the following day, a diet of 1269 calories was ingested (45 grams protein, 45 grams carbohydrate and 100 grams fat) and 7 grams of sugar were excreted in the urine. During this day there was a return of the diacetic acid in the urine. On the next day the caloric content of the food reached 1790 (60 grams protein, 60 grams carbohydrate and 140 grams fat), a diet that was continued for the next ten days. During this time, the sugar content of the blood averaged 250 mg per hundred c.c., but the sugar content of the urine gradually diminished until on the ninth and tenth days of the diet, only a trace of sugar appeared. During this period, he received ten units of insulin three times a day.

When the glycosuria had practically disappeared, 12 units of insulin were given twice daily. The caloric content of the diet was increased to 2104 (70 grams protein, 70 grams carbohydrate, 170 grams fat). The specific gravity of the urine ranged between 1006 and 1010, the fluid intake being kept between 4000 and 6000 c c. in the twenty-four hours.

On the day after admission, exploratory puncture of the left chest was done and 100 c c of yellow, creamy pus were removed. Smears of this pus revealed no tubercle bacilli, but a bacteriological culture subsequently showed the presence in it of the *Staphylococcus aureus*. Smears of the sputum obtained on this day showed the presence of many tubercle bacilli.

A week after admission, a needle was again introduced into the left pleural cavity and 75 c c of pus were removed, subsequent to which 75 c.c. of a 1-5000 solution of gentian violet were injected. Two days later, another puncture was made with the idea of intro-

ducing more gentian violet, but the patient began to cough up blood and the needle was withdrawn and the injection omitted. Morphine was administered and an ice-bag applied to the chest and the symptoms quickly passed off

A roentgenogram of the chest revealed consolidation of the left upper lobe, fluid in the left pleural cavity, displacement of the heart to the right and some fibrosis of the right lung. The Wassermann test was negative. Examinations of the blood revealed 3,920,000 red blood-corpuscles and 55 per cent hemoglobin.

In *summary*, we have had to deal here, then, with a man of middle age, who was formerly a heavy eater and obese, but who recently has lost 50 pounds in weight, a man who had a sister who died of diabetes mellitus. In addition to his diabetes, he has developed a pulmonary tuberculosis and a staphylococcic empyema. Recently, he has shown signs of a severe acid intoxication with threatened coma. Under a dietetic régime, with insulin therapy and measures directed toward combating the acidosis, his urine has become sugar free and the signs of acid intoxication have passed off. He still has, however, a pronounced hyperglycæmia, averaging 250 mg per 100 c c, he suffers from active pulmonary tuberculosis, he has a staphylococcic empyema, he is moderately emaciated, and there is a moderate secondary anæmia (hemoglobin 60 per cent.) Though the immediate danger has been circumvented by the therapy thus far employed, it is obvious that therapy still has a difficult task ahead of it. To some of the special features of this task, I shall refer in the further discussion.

ETIOLOGY OF DIABETES

In the production of any pathological phenotype (or realized person), we have always to consider, on the one hand, the genotypic pattern (inheritance) and, on the other, the paratypic influences (environmental factors). That either or both may be concerned in the origin of diabetic phenotypes now seems clear. There is growing evidence of the occurrence of diabetes in families. It would seem certain that, in many families at least, a predisposition to diabetic disturbance of metabolism must be sought in "gene pathology." But even where a predisposition is inherited, the influence of environ-

mental factors also can usually be traced, and it seems certain, too, that persons of normal inheritance may, through disease-producing factors in the environment, develop diabetes, for we often see diabetes develop (in families that are non-diabetic) because of excessive ingestion of carbohydrates over long periods, because of lues or other diseases that cause destruction of the pancreas or injury to that organ, or because of exogenous factors that influence endocrine organs other than the pancreas, particularly the thyroid, the suprarenal and the pituitary gland. Trauma to the nervous system may in some cases apparently be responsible for the origin of the diabetic disturbance of metabolism, and infections of various sorts may so injure the hormone-producing organs or the nervous system as to set free this disturbance.

That in our patient a pathological genotypic pattern may have been present seems probable from the fact that one sister died of diabetes mellitus. But that exogenous factors have in him also been influential seems probable. He has always been a "heavy eater", he became obese, and he has, accordingly, thrown excessive strain upon his blood-sugar regulating mechanism. Moreover, he has active pulmonary tuberculosis, a staphylococcic empyema, and suspicious teeth and gums. It may be argued, of course, that the development of pulmonary tuberculosis and the susceptibility to staphylococcus infection and to oral sepsis may have depended upon a hyperglycæmia. On the other hand, these infections may have been in part responsible for injury to an endocrine mechanism that was faultily developed because of heredity. It is certainly now well established that, in persons predisposed to the diabetic metabolic disturbance, any infection, even a common cold, may be a "releasing factor" that makes a latent disturbance become manifest. In trying to estimate the relationship of infections to the onset of diabetes mellitus, it must be remembered that mild diabetes may have existed long before the infection occurred. It is probable that many of the cases reported as due to infection have really been instances in which the infection turned latency into manifestness. Diseases of the biliary passages may stand in special relation to diabetes because of the communication between the lymphatics of the duodenum and the lymphatics of the head of the pancreas. Recently, metastatic pancreatitis secondary to recurring tonsillitis has been incriminated, but we should be

cautious in giving credence to this view, though it is probable that recurring tonsillitis, like any other infection, may decrease carbohydrate tolerance. In this connection, it is interesting that in the two periods of child life in which tonsillar hypertrophy is maximal (fourth year and tenth year) we see also the two maxima of the occurrence of childhood diabetes (*diabetes infantilis* and *diabetes puerilis*), as von Pirquet has pointed out.

THE CLINICAL FEATURES OF DIABETIC COMA AND PRE-COMA

This patient on admission was in a state of diabetic pre-coma and it was, as you have heard, only through the prompt and energetic measures resorted to that coma was averted.

It must be remembered that the acid intoxication that gives rise to pre-coma and to coma may, in any diabetic patient, come on suddenly, without prodromata. Physicians having diabetic patients under their supervision must, therefore, not only always be on the watch for the premonitory symptoms of acid intoxication, but also make laboratory tests often enough to discover in the urine or in the blood the signs that herald its approach.

The occurrence of abdominal pain or of burning in the epigastrium (especially if accompanied by vomiting), persistent constipation, a dry, red tongue, a loss of turgor by the skin or an acetone odor to the breath should never be overlooked in a diabetic patient. Of course, if amblyopia, drowsiness, mental sluggishness or Kussmaul's deep breathing appear, one can feel very sure that the patient is in a pre-comatous stage and is in great danger of the development of actual coma. In all such cases, the urine should be controlled by tests for diacetic acid, blood-sugar estimations should be undertaken, and the carbon dioxide tension of the blood should be estimated. As an acidosis becomes more profound, the disturbances of the nervous system, of the gastro-intestinal tract, of the renal excretion and of the circulation become more marked. The body loses water rapidly, partly because of the polyuria, the vomiting and the increased depth of the respirations, but also partly because the cells of the body have become incapable of binding water to them.

It is usually very easy to differentiate diabetic coma from conditions that resemble it (uræmic coma, periodic vomiting with acetonæmia, and tuberculous meningitis). In uræmic coma, the

odor of the breath is urinous rather than fruity, the reflexes are increased rather than diminished, the blood-pressure is usually increased and the urine contains blood and much albumin rather than sugar and acetone bodies. In periodic vomiting with acetonæmia there is no glycosuria, the breathing is normal and the blood-sugar is low. In tuberculous meningitis, especially in children, there may be glycosuria in the end-stages, but the previous history of the case, the presence of paralyses in the domain of the several cerebral nerves, and a positive Kernig's sign make the differentiation easy.

THE METABOLIC DISTURBANCE IN DIABETES MELLITUS

The amount of investigative work done during the last decade with the object of determining the exact nature of the metabolic disturbance in diabetes is simply appalling. In preparing for this clinic, I have gone through several hundred pages of the recent literature bearing upon the topic and it must be admitted that, though a vast deal of knowledge has been gained, the precise nature of the metabolic disturbance is still in many respects obscure. I can, of course, make no attempt to discuss any of these researches in detail, but you may be interested in knowing how the situation looks to me after a fairly careful survey of the newer literature on the subject.

In the first place, it must be kept in mind that there may be more than one form of saccharine diabetes. But it is the most common form, that in which we have good reasons to believe that the function of the islands of Langerhans in the pancreas is insufficient, that we are all most interested in. In this condition, we are now sure of at least several very important facts. The most important fact of all is the disturbance of blood-sugar regulation that results in a pronounced and continued hyperglycæmia. In normal persons the content of the blood in sugar is fairly constant. In other words, there must exist some regulatory mechanism that controls, on the one hand, the entrance of sugar into the blood and, on the other, the departure of sugar from the blood. When sugar is absorbed from the alimentary tract after the ingestion of carbohydrate-yielding food it passes through the liver before entering the general circulation. The liver is capable, as every one knows, of storing carbohydrate, the sugar being polymerized within the liver-cells to glycogen for any

reason the blood-sugar level falls, the liver is called upon (through a neuro-endocrine regulatory mechanism) to mobilize some of its stored carbohydrate so that glucose is given over into the blood. The departure of sugar from the blood to the tissues depends apparently upon the avidity of the various tissue-cells (above all the muscle-cells) for sugar and upon the capacity of these cells to change sugar, to split it up into simpler components and to oxidize it ultimately to carbon dioxide and water. Obviously, the accumulation of sugar within the blood so as to make the blood-sugar content exceed the normal level might depend upon either (1) an over-production or over-mobilization of sugar or (2) an under-utilization of sugar in the tissues. It is in diabetes mellitus, especially, that we meet with a disproportion between sugar production and sugar utilization, between the amount of sugar entering the blood and the amount of sugar leaving that fluid, in other words, with a hyperglycæmia. Now it is just here that differences of opinion exist with regard to the nature of the metabolic disturbance and the origin of the hyperglycæmia in diabetes mellitus. There are some who believe that the condition depends entirely upon an over-production or an over-mobilization of sugar, in other words, entirely upon the entrance of too great quantities of sugar into the blood. There are others who believe that the process depends entirely upon an incapacity to remove sufficient amounts of sugar from the blood and to utilize them in the tissues. And there are still others who believe that in diabetes mellitus, we have to deal both with an over-production and over-mobilization of sugar, on the one hand, and with an incapacity to withdraw and to utilize the sugar withdrawn from the blood on the other.

Most of the sugar that enters the blood is derived from the carbohydrate of the food. Some of it, however, comes from the protein of the food and in diseases like Graves's disease, in which tissue protein breaks down over-rapidly, this disintegrating endogenous protein contributes also to the sugar content of the blood. Many have thought that the fat ingested in the food may be converted also into sugar and may increase the blood-sugar content. The fiercest battles have been and are being fought with regard to this point. But one has only to read Lusk's critical review of the whole subject to realize that the

proof has not yet been brought (either experimentally or clinically) that fats can be converted into sugar in the body metabolism

There is much evidence to show that the capacity of the liver to store glycogen depends largely upon the integrity of the insular apparatus of the pancreas, though in the mobilization of sugar from the liver, neural influences and the amount of epinephrine produced by the medulla of the suprarenal glands are important

As to the precise form of sugar that exists in the blood, there has been much dispute. We now know that there is a series of different varieties of glucose that depend upon the stereochemical configuration of the glucose molecule. I need mention only alpha-glucose, beta-glucose and gamma-glucose to illustrate what I mean. It is believed by many that glucose in the form in which it exists in the blood cannot be utilized for oxidation by the tissues until it has undergone a stereochemical transformation, which permits of enzymatic splitting in the tissue-cells precedent to oxidation. And it is believed by some that insulin is the substance that is responsible for this stereochemical transformation of "transport-glucose" into a glucose that can be split and oxidized.

Those who assume that the main disturbance of metabolism in diabetes consists of a disturbance of the combustion of sugar rely upon the fact that acetone bodies appear in large quantities in this disease, for in severe diabetes, ketonæmia and ketonuria are symptoms that are coordinated with the glycosuria and the hyperglycæmia. It was long ago pointed out that fats can be successfully consumed in the body only "in the flame of the carbohydrate fire."

The acetone bodies are derived from the fatty acids in some way or another. It is possible that certain stages of the fatty acid disintegration represent the mother substances of the acetone bodies. On the other hand, some believe that certain intermediary cleavage products of sugar unite with fatty acid derivatives to form the acetone bodies. In this connection, we owe much to the researches of Shaffer, who first demonstrated mathematically how much carbohydrate must burn in order to burn up at the same time a definite mixture of protein and fats to carbon dioxide and water without leaving residue. It was from these studies that he deduced his doctrine of ketogenic and anti-ketogenic equilibrium, which is of great impor-

tance for the practical dietetic treatment of diabetes mellitus, he concluded that ketosis appears when the ratio of ketogenic molecules to total anti-ketogenic molecules (calculated as glucose) in the mixture being metabolized exceeds 1 : 1. He believes that the first question to decide for a diabetic patient is "not how much fat can be allowed in his diet, but how much extra glucose, in the form of food carbohydrate, is necessary in order to provide a safe margin over a ketogenic balance."

In summary, it seems to me that the evidence at present available favors the view that *both* the capacity to store sugar in the liver and the capacity to utilize sugar in the tissues are decreased in the metabolism of diabetic patients. It seems probable further that both of these forms of lessened capacity depend in the main upon an insufficient production of insulin by the pancreas, though it must be admitted that other factors (both endocrine and neural) may play a part in the disturbance of the regulatory mechanism, either through influencing the endocrine apparatus of the pancreas itself or through influencing other factors concerned (sugar storing in the liver, sugar mobilization from the liver, disintegration of endogenous protein, stereochemical transfiguration of the glucose molecules, enzymatic activity of tissue-cells) without the intermediation of the insular apparatus itself. We can, I think, feel very sure that both factors of blood-sugar regulation (sugar inflow and sugar outflow) are disturbed in diabetes mellitus, even though the finer mechanisms of this faulty regulation are not yet well understood. There is some evidence to show that insulin accelerates the oxidation of sugar in the muscles, for it is in them that the glucose-diphosphoric acid (lactacidogen) is burned. It may be, as I have already said, that its action consists in changing the stereochemical configuration of the glucose molecules perhaps before they are phosphorylated.

THE EVALUATION OF BLOOD-SUGAR FINDINGS

You will recall that the content of the blood in sugar is one of the most constant findings on laboratory examination of normal people. The amount present is approximately 100 milligrams per 100 c.c. The determination of the sugar content of the blood (fasting) is a fairly precise measure of the severity at the moment of a

given diabetic process. Thus, at the beginning of the disease one may find only 120 or 130 milligrams per 100 c.c., whereas in the severer forms of diabetes the fasting blood-sugar will be as much as 270 to 300 milligrams per 100 c.c.

Very high blood-sugar levels are met with in diabetic coma and in pre-coma. You will recall that in the present patient, no less than 512 milligrams per 100 c.c. were found on admission. In some patients as many as 1000 milligrams per 100 c.c. have been encountered!

The estimation of the blood-sugar may also be utilized for the determination of the blood-sugar curve following the ingestion of glucose. One estimates first the fasting blood-sugar and then administers, say, two grams of glucose per kilogram of body-weight and then makes three or four successive blood-sugar determinations, one at the end of half an hour, one at the end of one hour, one at the end of one and a half hours and, finally, one at the end of two hours. In normal persons, the highest level of the blood-sugar following upon the ingestion of glucose will occur within a half hour. At the end of one hour the blood-sugar content will be found to be falling, whereas, at the end of about an hour and a half, there may be a definite fall of the blood-sugar content below the normal level (so-called "post-hyperglycæmic hypoglycæmia"). At the end of two hours the slight hypoglycæmia will have passed off and the normal blood-sugar level will again have been gained.

Conditions are very different in diabetes mellitus. In the first place, the fasting blood-sugar will be found to be above normal and after the ingestion of glucose by the patient, the rise of blood-sugar occurs more quickly, the absolute values met with are higher and the blood-sugar curve remains high, so that even at the end of three or four hours, the blood-sugar content will still be higher than it was when tested fasting.

Interesting observations have been made of the blood-sugar curve after several successive doses of glucose. This method was introduced by Hamman and Hirschman of Baltimore in 1919 and the results of these investigators have been corroborated and extended by the studies of Staub (1921) and of Traugott (1922). In normal persons, if the second dose of glucose be given one hour after the

first dose, there will be no further increase in the blood-sugar content, whereas in diabetes, there is an increase after every dose of glucose administered

THE MANAGEMENT OF DIABETES BY A COMBINATION OF DIETETIC TREATMENT WITH INSULIN TREATMENT

As you have heard, this patient has been treated both by diet and by insulin. Owing to the threatened coma on admission, he was immediately starved and was given in the course of a few hours no less than 140 units of insulin. Within twenty-four hours, the urine was sugar-free, the signs of acidosis had disappeared and the blood-sugar content had been reduced from a level of 512 milligrams per 100 c.c. to a level of 64 milligrams per 100 c.c. In other words, a temporary hypoglycæmia had been produced. Because of this, a little food was administered at once and the signs of hypoglycæmia quickly passed off. As I have outlined to you, the diet was gradually increased in amount and as glycosuria as well as ketonuria reappeared, the insulin treatment was begun again. The chart shows that with gradually increasing food intake and with the continuance of about 30 units of insulin per day, divided into three doses, the patient gradually became sugar free and the acetone bodies also disappeared from the urine. You will notice, however, that the blood-sugar has not yet been reduced to normal. It is still averaging about 250 mg. per 100 c.c. This is still a fairly high grade of hyperglycæmia and it is imperative from now on to resort to measures that will reduce the blood-sugar to approximately a normal level, while at the same time giving a diet that will permit the patient to combat the two infections from which he suffers (staphylococcus empyema and pulmonary tuberculosis). Undoubtedly, the existence of these infections and of the febrile reaction makes the insulin effect more quickly exhausted than it would be in persons who had no such infections. And, since to combat the infections, a diet of fairly high caloric value must be given, it will be essential to increase the insulin dosage and to distribute the dosage through the twenty-four hours in such a way as to reduce the blood-sugar to normal, despite a liberal food-intake. This can, I feel sure, be accomplished, for we have already seen from the insulin administered when the patient came in that he responds actively to larger insulin doses, indeed, a hypo-

glycemia was temporarily produced. There is then here no so-called "insulin resistance" and our problem is to find the dose of insulin and the intervals at which insulin should be administered to this particular patient in order to keep the blood-sugar normal while we nourish the patient adequately. This problem will doubtless be solved by the staff at the Meicy Hospital during the period immediately ahead.

In arranging for the permanent diet of a diabetic patient, after preliminary testing has shown the carbohydrate tolerance or lack of tolerance, several principles must be kept in mind. In the first place, the permanent diet should not exceed the body's needs, for it is important that no avoidable strain should be thrown upon the insular apparatus of the pancreas. In the second place, the amount of food given should be enough to abolish hunger, to maintain a normal body-weight (which for the diabetic may well be a little below that calculated for the normal in general), to maintain a feeling of general well-being, and to restore capacity for normal bodily and mental work. Nevertheless, the urine must be kept sugar free, the content of the blood-sugar must be kept at the normal level, and the food ration must be a well-balanced one as regards protein, fat, and carbohydrate. It must contain also sufficient mineral salts, water and vitamins.

Time will not, of course, permit me to go into the details of the arrangement of diabetic diets (which is an individual problem for each patient), but the task of the dietetic management of diabetic patients has been greatly simplified, especially by our American clinicians. In the last edition of E. P. Joslin's book, you will find definite directions that may easily be followed. The standard diet introduced by Mosenthal and the graphs for calculating the relative amounts of protein, fat and carbohydrate in diabetic diets introduced by McCann are very valuable. In Doctor Pincoffs' Clinic, the custom has been to follow fairly closely the dietetic methods of Woodyatt, of Chicago, which are much like those of Newburgh and Marsh. Allen and his pupils are inclined to give rather less food than are other American clinicians. Moreover, Allen protests strongly against the giving of as much fat as is contained in the diets recommended by Woodyatt and by Newburgh and Marsh. R. H. Major roughly estimates that each adult should have thirty calories per kilo and that

10 per cent of the total calories should be given in carbohydrates, whereas the amount of protein in grams should be twice the amount of carbohydrate in grams and the amount of fat in grams should be three times the amount of carbohydrate in grams

According to Marsh, Newburgh and Holly (1922), the protein intake is limited to $\frac{2}{3}$ gram per kilo of body-weight. Shaffer lays stress on the maintenance of ketogenic-anti-ketogenic equilibrium in the diet and suggests that at least 10 per cent. of the total calories consist of carbohydrate, about 10 per cent. of protein, and not more than 80 per cent as fat Wilder and Winter (1922) and Ladd and Palmer (1921) think that ketosis can be prevented even when the proportion of ketogenous substances is much greater than in Shaffer's diets Woodyatt's formula is $F = 2 \times C + \frac{P}{2}$

In von Pirquet's clinic in Vienna, 10 per cent. (not more) of the total calories of the diet are derived from protein and every diet is made to contain from forty-five to sixty grams of carbohydrate (180 to 240 cal.), the remaining calories being supplied as fat.

In some of the German clinics, in arranging diets for mild diabetics, 25 or 30 calories are allowed for each kilo of body-weight, and $\frac{2}{3}$ gram of protein per kilo is given. The number of grams of fat given is estimated by dividing the total number of calories by 17 and the number of grams of carbohydrate by dividing the total number of calories by 10 (Brugsch, Harsters and Seelig)

The so-called "carbohydrate cures," in which seven doses per day of thirty-gram portions (cereals and fruits) poor in protein are given by Falta in combination with insulin, have been found particularly valuable in the treatment of infections both tuberculous and non-tuberculous and in the treatment of cases that present obstinate acidosis The old oatmeal cure of von Noorden is also helpful if there be a tendency to acidosis After one fast day, three or four oatmeal days follow in which 200 grams of oatmeal are given as gruel with 100 grams butter stirred in, after that a vegetable day with 100 to 150 grams fat is prescribed before returning to the ordinary diabetic diet.

Recently, "caramel cures" have been used instead of the oatmeal régime, 65 grams mellitose (ciba) are mixed with 200 grams of cream, flavored with vanilla and boiled, then the beaten yolks of two

eggs are stirred in and the whole mixture concentrated by means of a water bath to the consistence of thick cream and sweetened with a few drops of a 20 per cent solution of crystal saccharine (Umber) This quantity may be given daily for three or four days

It is well to remember that in emaciated diabetics, suffering from tuberculosis or other infections, it is possible to feed as abundantly as in an ordinary rest cure, provided one gives enough insulin The patient before you is now emaciated and he suffers from two severe infections After the blood-sugar has been made normal in this patient, it will be desirable to give enough insulin to permit of his being fed very liberally indeed

The indications for the use of insulin are divided between "absolute" indications and "relative" indications, thus, in diabetic coma or pre-coma, in patients without any carbohydrate tolerance, in patients with marked sensitiveness to protein ingestion, and in patients suffering from tuberculosis and other infections, the indications for the use of insulin are "absolute", whereas, in the desire to shorten the period of dietetic testing, in the desire to abolish the more stringent diets (including fasting and vegetable days), in the treatment of mild intercurrent infections, in preparation for operations, and in the treatment of under-nutrition cases, we see "relative" indications for the use of insulin.

A rough way to estimate the amount of insulin to inject is to allow 0.3 to 0.5 unit of insulin for each gram of sugar excreted in the urine. Or one may begin with ten units twice a day and gradually increase until the desired effect is produced The primary task is to determine the optimal diet, the secondary task is to seek the optimal amount and distribution of the dosage of the insulin needed

It is a pity that insulin is so dear! Still, the cost has been greatly reduced and ever better methods of preparation are being devised It is hard to get funds to supply sufficient insulin, as yet, for the treatment of many deserving indigent patients Certainly, city and state governments and the public should supply funds that may be drawn upon for the purchase of insulin when it is greatly needed. The tendency at the moment is to use insulin even in the milder cases, particularly in children, in whom the disease is so likely to progress rapidly By resorting to insulin early, much can apparently be done to protect a damaged insular apparatus from further injury

Much work has been done regarding the best way to administer insulin when it is needed and particularly upon the optimal distribution of the insulin dosage through the twenty-four hours of the day. In von Pirquet's clinic in Vienna, in mild cases of diabetes mellitus, two injections are given at twelve-hour intervals, the dosage being in the proportion of 6 : 4. In severer cases of diabetes and particularly where there is a fresh tuberculosis, three injections are given in the twenty-four hours—one in the morning, the second nine hours later and the third seven hours later (so that there are eight hours intervening between the last dose at night and the first dose in the morning). The relative proportions of the three doses are as 5 : 2 : 3, the smallest dose being given in the middle of the day.

In patients such as the one before you with outspoken infections and with emaciation, it is quite likely that more than three doses will be needed in order to keep the blood-sugar level down to 100 milligrams per 100 c. c., while at the same time we make the patient gain weight. The exact dosage and the optimal distribution of the dosage will have to be worked out in the clinic.

Some have maintained that it is dangerous to give insulin when there is a tuberculous infection in the body because of the focal reactions that have been observed. It has, however, been shown that these focal reactions do not depend upon the insulin itself, but upon protein present in the insulin preparation used. If one uses de-proteinized insulin (and most of the insulin now available is de-proteinized) one need have no fear of focal reactions in tuberculous cases. Indeed, in my opinion, it is imperative to give insulin when diabetes is complicated by active tuberculosis.

In preparing diet lists for patients to use at home, I should like to call your attention to a convenient method that has been worked out by Doctor Rockwood of Professor Pincoffs' Clinic. In the diet lists that he has prepared, the patient's attention is directed less to the number of grams of carbohydrate, protein and fat than to the glucose value of each portion of the diet ingested. This makes the lists much simpler for the layman to use. The method is particularly well adapted, too, for private practice and for use in the out-patient departments of hospitals.

If an apparent resistance to insulin be met with, for example, in the treatment of cases complicated by tuberculosis or other infec-

tions, one should make sure, in the first place, that this apparent resistance is not due merely to the fact that the insulin effect is more quickly exhausted in infections than it is in diabetic patients without infectious complications. Sometimes a redistribution of the insulin dosage throughout the twenty-four hours will do away with this apparent resistance. If it does not do so, one should try another preparation of insulin, for though the insulins are becoming more alike, there are still differences among them and one finds, sometimes, that one variety of insulin will be effective when another will not. There is even a belief that patients may become accustomed to insulin as they do to morphine, in other words, that there is an "insulinism" comparable to morphinism. If such cases exist, a change of the preparation may be advantageous.

At the beginning of the insulin era, when the attempt was too often made to get along with one larger dose per day, instead of giving two or three doses distributed through the twenty-four hours, hypoglycæmia was much more common than it is at present. Though we now know that the dangers of hypoglycæmia have been exaggerated, there is some real danger. It must be admitted that there are single cases in which death has occurred, but they have been rare. It is important, however, to recognize hypoglycæmia when it exists, certainly, when larger doses of insulin are being given, its administration should be controlled by blood-sugar estimations at longer or shorter intervals. In this connection, I would draw attention to the desirability of using the micro-methods of determining blood-sugar for which a small quantity drawn from an ear-lobule will suffice.

Every physician who attempts the management of a diabetic case should be familiar not only with the severer symptoms of the hypoglycæmic reaction, but also with the mild and premonitory symptoms. Of the latter may be mentioned headache, nausea, subjective feelings of heat, tremor, drowsiness, a feeling of hunger, and weakness. In the severer hypoglycæmias there may be symptoms of motor irritation (cramps, spasms, even epileptiform convulsions), extrasystolic irregularities of the heart, visual disturbances (diplopia, convergence spasm) and peculiar psychic manifestations (depression, excitement, sometimes aphasia).

In patients in whom the signs of a hypoglycæmic reaction have appeared, the physician should administer at once from 10 to 20

grams of carbohydrate, either in the form of a little cane sugar, bread, orange juice, stewed fruit, or marmalade

One can even recognize the occurrence of hypoglycæmic episodes in patients in whom a *coma diabeticum* has not passed off. Thus, while the patient is still unconscious, the occurrence of extrasystoles, the disappearance of the Kussmaul breathing, or the occurrence of any striking muscular rigidity, should make one think immediately of a hypoglycæmia and some carbohydrate should be administered. The patient being unconscious cannot ingest carbohydrates. One injects, therefore, 100 or 150 c c of a 10 per cent solution of glucose, subcutaneously or intravenously or one may give a 10 per cent glucose solution per rectum by the Murphy drip method.

Insulin should be given hypodermically. Subcutaneous injection is better than intravenous injection, for by the former method of application, a local depot is established and the insulin effect is not so soon exhausted as when the insulin is injected directly into the blood.

Where two or more doses of insulin per day must be given over a considerable period, it is best to inject in turns first in the right thigh, then in the left thigh, then in the right upper arm, then in the left upper arm, then in the right buttock and finally in the left buttock. By such cycles one prevents the giving of too many injections in one locality, for if this be not avoided circumscribed atrophies of the subcutaneous fat will occur, due to local lipodystrophy that is caused by the insulin injections.

Attempts to give insulin other than by the subcutaneous route have proved unsatisfactory. Inunctions of insulin-salve, lingual administration, administration through the stomach tube or duodenal tube, and administration by way of the nose, the rectum and the vagina cannot be recommended, for though small amounts of insulin can become absorbed by these routes, the proportion absorbed to the amount used is very small and the expense is prohibitive. Moreover, one has no way of measuring the exact amount that is absorbed, so that one remains in the dark regarding the amount of insulin needed to produce a desired effect in the patient.

Intelligent patients can be trained to give themselves subcutaneous injections of insulin or some member of the family can be easily taught to give them. Laymen, however, should be cautioned never to relax the methods of asepsis when using insulin over a long period.

In the treatment of patients at home, precise directions regarding food to be taken, the exact quantities of fat, protein and carbohydrate, the times and the amounts of the insulin injections, and, particularly, the relation of these times to the times of meals, should be given. In order to avoid monotony in diet, a list of exchangeable equivalents of the carbohydrate foods and of the protein foods should be furnished. In all but the severest cases, it may be possible to allow each patient to have an extra dessert occasionally, provided it be not too rich in carbohydrates. A certain amount of tact is necessary for the construction of suitable diabetic diets, if the physician or his dietitian possess this, it will usually be found possible to permit diets that will not be felt as any hardship by the patients.

In the home treatment of diabetes mellitus, special warning should be given about the occurrence of any febrile attack. If the patient should, for example, develop a severe cold with fever he should immediately stop the ordinary diabetic diet upon which he has been placed, and for one day at least take only fruit (apple sauce or other stewed fruit) or it may be well to follow the fruit diet for two or three days. The physician should be notified at once regarding the occurrence of the infection and, should it continue, the patient should be transferred to a hospital or to a nursing home where the diet and insulin dosage can again be carefully controlled by urinary examinations and by estimations of the blood-sugar.

In the treatment of diabetic school children, Priesel and Wagner urge that all go to the public schools. The distribution of the dosage of insulin must be so arranged that the first injection will be given early enough so that the child can conveniently have his carbohydrate-containing breakfast before going to school. The teacher should be informed by letter that the child is a diabetic and is receiving insulin and that there is always a possibility of a hypoglycæmic reaction occurring, so that should any symptoms appear a little carbohydrate can be immediately given to the child. It is so important, however, that children should be kept at school (1) in order that they shall not develop an inferiority complex and (2) because they really also need to be educated, that it is justifiable to take certain slight risks in sending them to school. Experience has shown that, for the greater part, diabetic children can continue at school and can do well there. Out-door play is not only desirable for them, but should be actually

prescribed Mild diabetic patients do much better when they have regular bodily exercise To-day, even a severe diabetes, if adequately treated by diet and insulin, is turned practically into a mild diabetes Of course, in schools where at times all-day excursions are made by the children, it will be necessary, as Priesel and Wagner have emphasized, to provide a special diet for the diabetic child, a matter easily arranged for by intelligent parents

In older children and in adults, some regular occupation should be followed As long as the diet can be maintained and as long as two or three injections of insulin can be given daily, practically every diabetic can continue his occupation, particularly if it does not involve excessive muscular work that requires a diet of high caloric content.

When one realizes what can be done now for the severer forms of diabetes, even for total diabetes in children, one must look upon the discovery of insulin as one of the greatest triumphs in medicine, not only of our age but of all time!

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Diagnosis and Treatment

ON THE TECHNIC OF MEDICAL DIATHERMY

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DIATHERMY, or the production of heat in the tissues of the body, by the passage of a high-frequency current has become one of the most widely used physical therapeutic measures of the present. The favorable reports published by competent observers in various departments of medicine have helped materially to overcome the misconception of the present medical generation about anything which is "electrotherapeutic" and manufacturers of apparatus are not slow to take advantage of this great interest, and, by employing either direct advertisement or the subtle force of the itinerant lecturer, are trying to sell diathermy apparatus practically to every physician. It will work to the discredit of these advanced electrical methods and will not be productive of the best results for the benefit of the patients, if medical men are led to believe that, after buying a diathermy apparatus, all that is needed is to apply some electrodes and set the controls, leaving the machine to do the rest. Some men try to do a little better. It is the writer's repeated experience that physicians come to him asking for instruction in diathermy alone. When asked how much they know about the elementary principles of electrotherapy, they cheerfully admit that they know nothing. Such lack of broad information, unfortunately, often results in serious consequences, as proven by a number of malpractice suits following diathermy burns. Barring certain unavoidable accidents, such burns are almost all traceable to lack of proper technic. In this article it will be our endeavor to point out some of the essential considerations for the safe and successful application of diathermy.

PHYSICS AND PHYSIOLOGICAL ACTION OF HIGH-FREQUENCY CURRENTS

D'Arsonval, of Paris, made the discovery in 1888 that an electrical current alternating less than fifteen times per second produced a succession of separate or clonic muscular contractions, at twenty

to thirty per second a continuous contraction (tetanus), the intensity of which increases till a frequency of about three hundred is reached. A further increase of frequency causes a decrease in the strength of contraction until at a frequency of ten thousand per second no apparent effect is produced upon either the motor or sensory nerves. The reason for this phenomenon is that with the extremely rapid changes in the direction of the current there is no possibility for the development of electrochemical reactions. High-frequency currents travel through the body tissues as solid conductors, and subject to the laws of electrothermic reaction, produce heat within these conductors in proportion to their resistance. The patient has no other sensation except that of warmth, and this can be easily regulated from extreme gentleness to the cooking or destruction of tissues. All medical forms of high-frequency currents are painless if kept within the limits of physiological heat toleration of the tissues.

The essential parts of any high-frequency apparatus are (1) a supply of alternating current, either directly from the AC mains or the change of a direct current supply into an alternating one by means of a rotary converter, (2) a high-frequency circuit, which raises the voltage or tension of the current by means of a step-up transformer and its alternation or frequency by a condenser—spark gap arrangement. The patient is connected in shunt to the high-frequency circuit and as at times his body offers less resistance to the high-frequency current than the internal resistance of the circuit itself, the part of his body included between the electrodes connected to the two terminals of the machine will be traversed by the high-frequency current.

There are three main types of high-frequency machines in existence. (1) The older type of d'Arsonval, in which currents of relatively high voltage (tension), of relatively low amperage (volume) and of intermittent and dampened oscillations are produced. Such currents exert a marked general systemic effect, increase metabolism, lower the blood-pressure, but produce only a moderate amount of local heat. They are properly called "currents of tension" but can be disregarded from the practical standpoint of this paper. (2) The newer type of apparatus furnishes currents of relatively low voltage, of high amperage and of sustained and dampened oscillations. Such currents exert a very marked amount of local heat and are called

"currents of quantity" or diathermy (3) The latest developments are machines producing undampened oscillations by a radio bulb apparatus or other arrangement, furnishing a "cutting" current for surgical purposes

Any of these three types of machines can be used for either medical or surgical action, *i.e.*, local or general stimulating or local destructive action, and can be applied either from two terminals or one special terminal, *i.e.*, in form of a bipolar or monopolar application. An elaborate, and for the beginner decidedly confusing, terminology has been built up to signify all these varieties, but in this short presentation we will confine ourselves to the details of the second type of currents—the diathermy currents as applied for the purpose of raising the local heat of the tissues within physiological limits

PRODUCTION OF LOCAL HEAT

The modern diathermy machine producing oscillations of one to two millions per second at a voltage varying from a few hundred to several thousand makes it possible that electrical currents registering a volume of from a few hundred to several thousand milliamperes on the hot wire meter pass through the tissues of the body

The degree and localization of the diathermic heat will depend on the following factors

(1) *The Type of Tissue Traversed*—According to the histological construction of the tissue and its amount of blood supply, it will develop a varying amount of heating under the influence of diathermy. There are definite measurements available as to the resistance of human tissues by electrical currents. According to Weldermuth, if the resistance of 0.5 per cent chemically pure salt solution at 18° C is a unit of 1, the resistance of fat tissue is 19.4, brain (average), 6.2, lungs, 3.75, liver, 3.1, skin, 2.75, muscle, 1.4. Alt and Schmidt measured the resistance of animal tissues against the direct (galvanic) current and found that if the resistance of muscle and blood is 1.0, the relation of other tissues is as follows: Skin, 1.25, brain, 1.56, tendon, 3.25, fat and fascia, 3.92, bone, 14.1. Currents of low tension (like the galvanic) travel along the way of the least resistant tissues, even if they have to follow a roundabout path to do so. The resistance of the skin towards the galvanic current is very

considerable and the polarity action of the current prevents the employment of currents of larger volume or tension. Currents of high tension and high frequency will always travel a straight pass between two electrodes, irrespective of the type of tissues between them. According to Joule's law, the heat developed in a conductor is in direct proportion to its resistance, and, therefore, a diathermy current will cause more heat in bones and fat tissue than in the muscles and blood—a most important therapeutic fact. On the other hand, the diathermy current will not choose the path of the most resistant tissue, if a *parallel path of lower resistance is open*. By applying cuff electrodes around a limb, there is no reason for the diathermy current to travel deep around the bones and joints, when the path along the less resistant blood-vessels, muscles, and other soft parts is equally open. To heat the deeply situated bony structures, they must be placed in the shortest path between the electrodes. For this reason, the “transverse” application of a joint is usually the method of choice for heating a joint or ligamentous-bony structures. If we want to heat up the soft parts of an extremity, longitudinal application will be preferable, either by circular cuffs or by plate electrodes suitably placed. Mucous membranes, on account of their more extensive blood circulation, tolerate a much greater amount of heat than skin surfaces. Experiments by many investigators have shown that human tissues can stand up to about 116° to 118° F heat without damage. Cumberbatch found that the sensitive female urethra will tolerate up to 113° of heat, while in the cervix 120° can be produced without discomfort.

(2) *Electrodes, Their Type, Position and Size* (a) *Material of Electrodes*—The requirements of proper diathermy electrodes are that they be good conductors and easily and accurately adaptable to the body surfaces. Thick tinfoil, about twenty-two gauge, made from a tin and lead alloy, is the most suitable and generally used electrode material. It can be cut into any shape or size desired and can be bent to conform to any body surface. These electrodes are placed in direct contact with the skin. Some men advocate the interposition of an absorbent pad soaked in salt solution, others, the moistening of the electrodes and the skin with soap lather. We have never used any interposed material or any soaping, either in our own work or in the Physiotherapy Department of the Reconstruction Hospital. We

found that by applying radiant light and heat for a few minutes to the area to be treated, the skin is quickly moistened by its own sweat secretions, then we hold up the plate electrode against the radiant light applicator to warm it up and then apply it against the area to be treated. The interposition of moisture or soaping between the electrodes and the skin has no material influence in decreasing the resistance of the skin (which is slight anyway) but will help in maintaining better contact, and the avoidance of prickling and stinging at the beginning of the treatment. We have given in the average 7000 diathermy treatments a year during the past five years with this technic and have had hardly half a dozen accidental burns during the entire period.

(b) *Securing of Electrodes and Conducting Cords*—Electrodes have to be applied and held snugly against the parts to be subjected to diathermy. Under the buttocks, the back of the chest, etc., the weight of the body will hold the electrode properly, and over the thighs, abdomen, front part of the chest, a small sandbag and pillow can be utilized, with the patient in dorsal position to hold the electrodes. By applying electrodes, however, over extremities, the face, or over-rounded portions of the body, a few turns with a woven elastic bandage about two and one-half to three inches wide will insure an even contact with the skin.

The conducting cords from the machine are attached to the electrodes, usually through some clip arrangement. Care should be taken that this clip is well fastened and that the weight of the conducting cord should not have a tendency to pull out the clip or even dislocate the electrode. For this reason, part of the cord should be held by the elastic bandage or the sandbag and the rest preferably supported on its way from the binding post.

Self-retaining electrodes. Recently several arrangements have been brought out by manufacturers, consisting either of a wooden frame holding wire-mesh electrodes with a felt backing in a ball-and-socket joint or of a more rigid type of suitably bent electrodes held opposite each other by a spring arrangement. These and other types of self-retaining electrodes are, unquestionably, time savers in a busy clinic and are suitable for many routine treatments provided they fit well and are secured with just the proper amount of pressure. They cannot, of course, replace the universal adaptability of the plain

tinfoil electrodes. In order to insure very accurate contact over delicate regions—the scrotum, finger-tips, or some rounded portions of the body—mesh electrodes or fine tinfoil can be used.

(c) *Size and Position of Electrodes*—We may state that as a general rule (1) the size of the electrodes should correspond to the size of the area which we wish to treat with diathermy, and (2) their position should be such that the part to be treated should be in the path of the diathermy current. To carry out these seemingly self-evident requirements in practice is often quite difficult.

With two electrodes of equal size in exact opposition over both sides of an area consisting of homogeneous tissue, there will be an equal amount of heat all the way through between the electrodes, provided that the electrodes are not too far apart. Kowarschik publishes a series of convincing experiments, through which he demonstrates that as long as the distance between the electrodes is not more than one and a half of their diameter, the heat effect will be equal all the way through. If this distance is greater there will be inevitably some dispersion of the heat effect in the central portion between the electrodes and if one wishes to counteract this, electrodes of proportionately larger diameter have to be put in opposition.

If the high-frequency current has to pass an area between the electrodes, the cross-section of which is smaller than that of the electrodes, there will be a concentration of heat effect in this narrow area. The warming up of ankles with a large plate over the sole of the foot and one cuff around the leg or the warming up of wrist-joints with a knob or cylindrical electrode in the palm of the hand and a suitable electrode over or above the forearm are well-known examples. The dosage of current must, of course, be calculated according to the narrowest cross-section.

With electrodes of unequal size being placed in exact opposition (parallel) the heating effect will be proportionately greater under the smaller electrode and we use this fact in some few instances where, on account of anatomical conditions, it is impossible to place the area to be treated by itself between two electrodes of equal size (Treatment of spinal column, point of the shoulder, frontal sinus, etc.)

When the electrodes are placed in a tilted position towards each other, the high-frequency current will naturally take the shortest path

between the electrodes and thus the heat effect will be greatest where the surfaces converge the most. If the two electrodes are placed practically on the same plane (as it happens when they are placed on the same surface of the trunk or of an extremity) the heating effect will be almost entirely limited to the area between the opposite edges. This "edge" effect is one of the most important factors in the causing of unexpected burns and has to be always carefully considered when electrodes are placed in other than exact opposition to each other. Wherever there occurs a concentration of the current through a shorter path or a path of lower resistance, there is a likelihood of a burn.

These facts about the passage of the current between the electrodes in varying position relate to a homogeneous path between them. The heterogeneous tissues of the body with their varying electrical resistance make the conditions for the production and control of local heat far more complicated. If the two poles of a source of electrical energy are connected by a very thick and a very thin wire, both in parallel, then most of the current will pass through the large wire offering the lower resistance and in consequence this thick wire will heat up more. If then the two wires are connected in "series" so that the current must pass one after another, the thin wire will heat up considerably more because it offers much more resistance and so this exemplifies Joule's law again. Our recommendation as to the transverse application of electrodes to heat up joints, and for the longitudinal one to heat up soft parts, is based on these considerations. The diathermy current will traverse the heterogeneous body tissues grouped in all sorts of combinations, both in parallel and in series, and the only satisfactory guide in the application of electrodes we possess, is the fact that the current will invariably travel along the shortest path, and some of the heating effects take place by conduction from the tissues in the direct path of the current. There is an unquestionable need of more scientific research to furnish definite measurements of the heat production, as it takes place in the various tissues of a limb or in the organs of the thoracic, abdominal, or pelvic cavity, under the application of diathermy at varying milliamperage, through varying paths and with electrodes of varying size.

In the so-called "cuff" method, malleable blocktin electrodes are placed all the way around a limb, so that their ends overlap. This

method is acceptable if (a) the extremity can be fully extended so that the current will travel all the way around and not concentrate on the flexor surface, (b) the cuffs are kept a considerable distance apart (fifteen inches and more) so that we can reasonably expect at least a part of the current to take a path along the soft parts and periarticular tissues lying beneath the skin. In calculating a safe milliamperage applicable with cuffs, one always has to consider that the current will take the shortest path from one electrode to another, and no matter how broad the cuff is, the active part of it will be always the edge nearest to the other cuff. The same consideration prevails when electrodes are placed over the same surface of the body or an extremity. The larger the size of electrodes applied, the larger has to be the milliamperage of the current in order to produce the same amount of heat. The smaller the area of the electrode, the greater the volume of current which will pass through it. In other words, the density of the current is in inverse proportion to the size of electrodes.

(3) *The Strength of Current Regulation of Dosage*—The volume and tension of the current is regulated by the number of taps or points taken off from the current regulator (rheostat) and by the varying of the opening of the spark gap. The spark gap of the majority of machines used in Europe is fixed and its width cannot be regulated during treatment. The heat control of these machines is therefore much more simple and achieved by the use of a single regulator. In American machines the spark gap has to be regulated during the course of each treatment. This arrangement provides a variable resistance for the control of the voltage and thus adds greatly to the flexibility of output. On the other hand, the double control, further complicated by the adding of separate controls for each of the multiple spark gaps, adds greatly to the difficulties of the beginner in mastering a proper technic. With the numerous apparatus of varying makes in use, it is difficult to give here detailed rules as to how to work the double set of controls. The principle should be to work up the current to the desired milliamperage (determined by the pathology, the size and position of electrodes) smoothly, always with a feeling of comfortable heat and with the absence of electrical pricking, this so-called "faradic" sensation. The latter is usually caused by too widely open spark gap, there-

fore, it can be stated that, as a rule, it is preferable to keep down the spark gap as low as possible and rather go up on the rheostat. Working a diathermy apparatus is like running an automobile, *i e*, every one learns by actual practice on his own machine how to get out the desired result in the smoothest way. A proper condition of the spark gap is essential at all times.

As to the actual amount of milliamperage to be used, it is the consensus of opinion of men using diathermy extensively that best results are not at all dependent on using the maximum amount of current the patient can tolerate. In cases of diathermy to the heart, in certain forms of neuritis, and in some cases of arthritis with poor vascularization, a milliamperage pushed to the limit may be harmful. As stated before, it is advisable to use a moderate amount of heat and longer treatments for treatment of internal organs. Mucous membranes can stand a considerably larger amount of milliamperage than the skin surface.

A fairly generally accepted method of calculation is to figure about one hundred milliamperes per square inch of the active electrode when applied to the skin. A round electrode of three-inch diameter would carry nine hundred milliamperes, while one of two and one-half by four would carry about one thousand milliamperes. The consideration of current concentration as an edge effect when the electrodes are not absolutely equidistant is always important, as well as the passage of the current through a narrower path than the electrode surface (wrists, ankles). The increase of milliamperage does not increase the heat effect in the same proportion, but in relation to its square. A double amount of milliamperage therefore results in four times the amount of heat under the electrode. This fact will explain why patients are so often so very sensitive to the slightest increase in milliamperage, after the limit of comfortable toleration is reached.

While as a rule the patient's heat sensation is an acceptable guide for most application of diathermy, we must be sure, at all times, that the temperature sense is not disturbed. In cases of peripheral nerve injuries, neuritis, and extensive scar formations, as well as central nervous disturbances (hysteria, locomotor ataxia) one always should test the heat sense before applying the electrodes, and if found defective, stay well below the dosage as calculated, according to the area of electrodes. In such cases the very exact

adaptation of electrodes and the avoidance of edge effects is even more imperative. Patients with a previous considerable amount of heat applications develop a certain lack of sensitiveness and in their eagerness to get a maximum amount of heat will get burns when least expected.

There are many other considerations as to the type and position of electrodes, and the dosage of current when it comes to the treatment of specific lesions in the various locations. Actual work under an experienced teacher is the safest method to master these and many other details.

(4) *Duration of Treatment*—It is evident that it takes a certain amount of time until the temperature of the part treated will reach the desired height and then, through automatic heat regulation (the blood-stream and conduction by the surrounding tissues), a condition of equilibrium will result, and a steady temperature is maintained. It is also evident that superficial parts can be heated up much faster than deep-seated parts. Therefore, for superficial affections, shorter treatments may be indicated than for deep-seated conditions. There seems to be practical unanimity to the effect that twenty minutes is the average duration for an efficient diathermy treatment. In chronic deep-seated conditions, a treatment of about one-half hour or even more time than this may work better.

The "Stimulative Technic"—Sampson differentiates between "sedative" and "stimulative" diathermy technic, the latter consisting of short treatments, started and ended abruptly with a wide-open spark gap at low milliamperage. The purpose of this procedure would be to stir up sluggish tissues, and it is especially recommended in non-union of fractures. While there is no question about it that this technic will "stir up" the patient's feelings, on repeated careful trial on ununited fracture cases, neither the writer nor some of his colleagues were able to get the expected benefits. Sampson himself has never published any convincing proof of his results.

APPARATUS

An efficient apparatus in good working order is indispensable for the proper administration of diathermy. There are at least eight to ten American manufacturers turning out machines which can be classified as standard, although there are considerable differences

as to the details and sturdiness of their construction and the mode of current regulation. A high-frequency apparatus runs most efficiently, if connected directly to an alternating-current source and this also eliminates the extra cost of a rotary converter. There are several makes of portable machines available, and, if used with the proper consideration of their somewhat limited output, they will be sufficient for almost any routine work. There is only one type of machine against which we must warn, the widely advertised cheap high-frequency outfits, which are claimed to furnish not only all the varieties of high-frequency current, but also sinusoidal current, galvanic current, and what not. In reality, they furnish neither an efficient nor smooth current of any sort, and, on account of their flimsy make, they will not stand wear. A well-built high-frequency machine of a standard type, with reasonable care, will last almost indefinitely. There has been, recently, some "sales talk" about the need of higher voltage and varying frequency in our machines. Such arrangements might add to the flexibility of control, but their ultimate therapeutic value is far from being decided. The lack, until now, of the central authority of an unbiased body in physical therapy has resulted in considerable confusion in this and other issues, inasmuch as every itinerant lecturer and every enterprising manufacturer set up his own authority and hired his own physicians. We can reasonably expect that the newly created Council on Physical Therapy, in conjunction with the national associations on physical therapy, and many earnest research workers, will furnish a reliable guidance in these problems to the part of the profession that is amenable to authoritative information. Some of the physical therapy enthusiasts lay entirely too much emphasis on some technical details of apparatus, whereas they lack the much more important emphasis of a thoroughly established diagnosis, the consideration of all other facts pertaining to the patient, the broad consideration of the relative value of physical therapeutic methods of varying character, along with other therapeutic measures.

GENERAL RULES OF DIATHERMY TREATMENTS

(1) Before applying electrodes, inspect carefully parts to be treated to make sure that the continuity of the skin is nowhere broken and that the heat sensation of the patient is normal. In case

of scar tissue, peripheral nerve injuries, hysterical anæsthesias, be extremely careful in the application of diathermy

(2) Choose the electrodes of proper material and size, apply them as nearly opposite as possible, make sure of good contact all the way through. See that the electrodes stay secured in the proper position—supporting and relaxing the part to be treated will aid in this

(3) Before connecting the electrodes with the cords to the apparatus, make sure that all switches of the same are “off” or in O position. After connections are made, make sure that they are tight and stay tight.

(4) Before turning on the current from the main inlet, inform the patient that all the sensation he or she can expect is that of mild heat. Instruct the patient to report any uncomfortable faradic sensation, pricking or burning, at once

(5) After starting the current flow through the main switch, open up gradually the current regulator (rheostat) and the spark gap. Only practical experience will teach you how to manipulate this double control properly

(6) Take about five minutes to go up to the maximum amount of milliamperage desired. Do not try to push the current up to the maximum amount of toleration during the first few treatments. Patients often get burned in their endeavor to show how much current they can stand. Remember the principle that a moderate amount of heat applied for a longer period is more effective than pushing up to the heat limit for a shorter period.

(7) If at any time during the treatment, patient complains of an uncomfortable sensation anywhere, turn back your controls and, if necessary, take off, inspect, and re-apply electrodes. When inspecting or adjusting electrodes, current should always be turned off altogether. Go up gradually again after such a procedure

(8) Do not leave patient alone during treatment, unless you have arranged that by the simple pulling of a cord or the turning of a switch, patient can turn off current at any time. Watch milliamperemeter during entire treatment, for an even flow of the current.

(9) At the termination of treatment, turn controls off gradually, taking a minute or two to stop entirely. When treating several

patients simultaneously, an automatic time switch or alarm clock, properly set at the beginning of treatment, will prevent "over treating"

(10) Take off electrodes only after current has been turned off entirely Inspect site of electrodes carefully after every treatment

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THE TREATMENT OF GONORRHOEA BY DIATHERMY *

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EVERY medical man who has to treat patients suffering from gonorrhœa knows by experience that in a rather high percentage of the cases a total cure cannot be attained by the ordinary medicaments and methods of treatment. A look over the literature may give him the tranquillizing conviction that the fault is not his, but that of science. Where science is (as Flexner defines it) "the sense of limitation, with the cool, persistent effort to pierce the barrier at its weakest spot," and where modern industry uses the same methods, a continual stream of new medicaments and methods of treatment is flowing to prove decisively that no method of treating gonorrhœa gives a guarantee of cure, and that any method often fails.

The question whether the treatment of gonococcal infection by diathermy may be such a desired and urgent improvement, is answered in different ways. The reason why I am inclined to answer this question in the affirmative, I will try to explain. Attempts to destroy the gonococci in the organism by the application of heat have already long since been made, and in different ways. The idea of curing gonorrhœa by high temperature owes its origin in the first place to observations on patients suffering from gonorrhœa, who show temporary freedom from discharge during acute fever, then to the results of laboratory examinations, which make it evident that the lethal temperature for the gonococcus is relatively low.

Santos and Boerner (1914) fixed the following figures for the gonococci. Killed at 39° C in ten hours, at 40° in six hours, at 41° in three and a quarter hours, at 44° in one hour, at 45° in thirty-seven minutes, at 48° in ten minutes, at 51° in three minutes. These data are generally accepted as being exact, whilst the contrary statements of Wertheim (1894), who demonstrated that gonococci could withstand heat up to 45° C during two hours, are generally neglected as being inexact. The solution of this problem should have a great importance in estimating the value of diathermy as a method of

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treatment of gonorrhœa. Investigations on this question in my clinics were carried out by Doctor van Putte. The culture-medium used was nearly like that given by D. Thomson in his handbook on gonorrhœa, *i.e.*, 1 per cent. peptone, $2\frac{1}{2}$ per cent agar, $2\frac{1}{2}$ per cent glucose in beef-extract, with $\frac{1}{2}$ per cent NaH_2PO_4 to a hydrogen-ion concentration (pH) of 7.8, two parts of the medium were mixed with one part of human blood-serum. With this excellent medium, upon which the growth of the gonococci is very luxuriant, van Putte found the following figures. Gonococci living after five days' exposure to 41.5°C , killed at 45° in six hours, at 50° in ten minutes.

These figures are much higher than those from Santos-Børner, undoubtedly the difference is due to the better qualities of Thomson's medium, namely, the human serum, the wetness and the right hydrogen-ion concentration.

After obtaining these results, we very likely would have lost courage and abandoned our intention to treat a number of patients with gonorrhœa by diathermy had not this treatment, undertaken simultaneously with the laboratory work, given apparently good results, similar to those observed by many other authors.

As an example of a case of gonorrhœa cured by diathermy, I can exhibit a card of a patient of twenty years, suffering from gonorrhœa (urethritis with inflammation of several lacunæ Morgagni and of the prostate gland) of two years' duration, treated in different ways without success. He was treated by diathermy for thirteen hours during two days. After these séances the patient was cured (control during six months).

This case is one of a number which were treated in the period before the investigations concerning the resistance of gonococci to heat had given the results above mentioned. Therefore, though the idea of killing the gonococci by heat in the organisms must be abandoned, the clinical observations gave us the stimulation to continue the treatment of gonorrhœa by diathermy, and we have found these efforts to produce good results in several cases.

Of forty-one patients treated by diathermy, thirty-four were cured after this treatment, and seven failed to respond to this form of therapy. Inquiring into the data in these seven cases, a reason was found for fixing special attention on one factor, namely, the duration of the gonorrhœa before the treatment by diathermy was begun. To

this factor our attention was drawn by the observation, in treating some cases of acute urethritis, that diathermy gave no success at all

In the seven cases of failure, it appears that five of them belonged to a series of six cases of gonorrhœa of less than six weeks' duration, while only two failures are found among thirty-five cases of gonorrhœa of a duration longer than six weeks (Afterwards I will return to this fact, which is of great importance for the theoretical explanation of the favorable influence of diathermy) However, before passing to the theoretical considerations, I wish to give consideration to several details (a) In several cases during one to three days following the diathermy treatment many gonococci were found in the discharge, most of them extracellular, (b) the irrigations (after Janet) were continued on the days during and after the diathermy treatment, (c) in the conviction that a long duration of several hours was required to destroy the gonococci by a temperature as high as possible, we gave a treatment of at least five hours' duration, (d) in several cases one session was not sufficient, and a second treatment had to be applied, some weeks later

Thus, Gentlemen, I am convinced, on account of the thirty-five cases which have been treated by diathermy and are cured after this treatment, that the cure was the consequence of the treatment in nearly all the cases, though I know as well as you know that it is not proved and cannot be proved But though I am convinced that gonorrhœa can be cured by diathermy, and that in cases where other treatments have failed, I have to acknowledge that I am not able to give you an explanation of this wholesome influence

We know that the gonococci can withstand a temperature which is much higher than that to which the tissues can be warmed without pain and burning by the diathermy stream, which is 43°C at the most (van Putte demonstrated that gonococci could withstand a temperature of 45° during six hours!) Therefore it is certain that the disappearance of the gonococci from the infected tissues is not due to the direct action of the heat on the invading organisms, there must be an indirect action whereby the power of the tissues to exterminate the gonococci is increased by diathermy

In favor of this interpretation there are certain arguments

(1) There was absence of cure in cases of less than six weeks' duration With Thomson and other authors I think that there is a

gradual development of anti-substances from the first week till about the sixth week of the disease, only after the production of anti-substances by the tissues themselves can an increase of this production be caused by diathermy

(2) These anti-substances are not produced by the mucous membrane, in several cases we saw numerous gonococci in the discharge in the days after treatment, which gonococci were easily removed by some Janet irrigations

(3) By injections of autogenous vaccines before and during the treatment, the results were improved

(4) An argument of no great importance is given by the only case of acute gonorrhœa of one week's duration, in this case diathermy resulted in cure in one session, it is possible that the anti-substances produced during the former infection six months previously had not yet disappeared

After propounding these hypotheses, I shall give some details about the method of applying diathermy

As ^{*}electrodes plates of lead are used for the indifferent or directing electrode, for the active electrode for treating the urethra nicked-copper plates are used, for the prostate electrode a nicked-copper rod four inches long, with a hole to introduce a thermometer This prostate electrode is enclosed in rubber for isolation, so that only the part of the electrode in the rectum (two and one-half inches) is active For treatment of the prostate gland the patient lies on his side on a couch, the active electrode is placed so that it is brought in close relation with the posterior surface of the prostate, and as nearly as possible parallel to the directing electrode (measuring ten to nine inches), which is placed on the abdomen just above the symphysis

For applying diathermy to the urethra, the penis is turned upwards so as to lie in contact with the abdomen One part of the active electrode is placed on the penis, where it is maintained by the patient, who is lying on his back, the second part of the active electrode is placed on the perineal and scrotal part of the urethra and is maintained by the operator. The patient has his back placed on the directing electrode (sixteen to nine inches) When these electrodes are in position, the urethra lies in its entire course between them, although they are not quite parallel An electrode was never placed in the urethra, for fear of burning it The position of

the electrodes is of considerable importance, since it determines the direction of the current through the region to be treated. The situation should be such that the shortest path between the active and the directing electrode lies in the region requiring treatment.

The degree of heat produced in the different organs depends on several factors. Strength of the current, form and size of the electrode, resistance of the tissue traversed, etc. Measuring of the temperature in the prostate itself is impossible, this can only be done in the rectum (*i e*, in the prostate electrode), in the urethra and on the abdomen. The method adopted here was devised after repeated trials and experiment.

Dosage—In the beginning of our investigations I was convinced that the strength of the current should be sufficient to produce the maximum degree of heat that can be tolerated without pain and without burning. Conducting the treatment in this way, a temperature to 43°C , measured in the prostate electrode, can be reached, from $41\text{--}43^{\circ}$, measured in the urethra and between the urethra and the abdomen. With the apparatus used, a current of from 1700 to 2000 milliamperes is required. It is impossible to say what will be the temperature in the different organs. Since we know that the gonococci are not killed directly by the heat, the question arises whether it is necessary to heat to such a high temperature, thus far I have not made sufficient experiments to answer this question.

On account of the idea concerning the sensitivity of the gonococcus to heat, the duration of each session was extended to from four to five hours. Very likely the results will appear to be as good or better when the diathermic stream is applied in shorter and more frequent sessions. If this proves to be the case, our method of treatment will be modified accordingly.

Conclusions—(1) Diathermy cures gonorrhœa in most cases so treated, even where other methods had previously failed.

(2) This treatment is indicated in every case of gonorrhœa which has not been cured by other methods at the end of two months.

(3) In gonorrhœa of less than six weeks' duration diathermy most often gave no results of any value.

(4) Diathermy combined with injections of autogenous vaccine may be recommended, vaccines are necessary before giving a second diathermy session, if after the first session no cure is effected.

PROBLEMS OF PARESIS

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UNTIL twenty years ago, before Nissl and Alzheimer had described the anatomic picture of progressive paresis, the question of syphilitic mental disturbances seemed to be a relatively simple one. Even then we were facing a great many unsolved problems, but the standpoint (conception) that paresis and tabes, being metasyphilitic diseases, are sharply contrasted with the remaining nervous diseases of luetic origin seemed to have made it perfectly plain what the theoretic and practical treatment of this sphere ought to be. To-day we are well aware that with paresis, the spirochæte is still present in the body and this fact is in itself a sufficient reason that we have to tackle afresh numerous questions that seemed to be already solved. Thus, for example, the separation of paresis from other forms of cerebral syphilis has become, both in theory and practice, much more difficult than it seemed to us ten years ago, partly because our conception of what disease really means in the sphere of psychiatry has altered and partly because of the impossibility of drawing here well-defined contours of the separate diseases. Constitution and reaction have more and more been taking the place of the former units of disease, and so it has almost become a matter of course for us that the arena in which spirochætes and the human body have been wrestling for centuries, is not divided by barriers, solely desired by our need for classification.

This is not all. Paresis is changing its appearance before our very eyes. Symptomatology and course have undergone such tangible changes these last few years that a future generation of alienists will find it rather difficult to imagine what the "classic paresis" is really like. Moreover, the disease seems to become rarer, at least in some places, whilst syphilis itself is rather increasing. We do not yet know what these changes are based upon. According to Hoche, *internal* reasons may have brought about a new stage in the alternate effect existing between the human body and the spirochæte. How-

ever, it may be possible that the introduction of *salvarsan* makes paresis rarer and easier only *with syphilitics* whose incubation time has been fulfilled and who were already *judiciously* treated with *salvarsan* in the secondary stage

ETIOLOGY

We shall discuss here briefly this problem and some other questions relating to etiology. We will only touch lightly upon the facts that are considered as certain, and we will say nothing about that almost historical quarrel whether paresis is necessarily the outcome of syphilis or not. But the fact that only a fraction of all syphilitics become paretics gives rise to the question under what special conditions mere syphilis may become paresis. Here we have to deal with three systematic possibilities. The disposition to paresis may exist in the constitution of the patient, or the tendency to the paretic process may be inherent in the peculiarities of the excitor, or, in the third place, we must suppose that the affection is caused by some other exogenous factors than syphilis.

Each of these explanations includes several very heterogeneous possibilities. To begin with the last factor we mentioned, it has sometimes been said that other exogenous causes, as, for example, injuries to the head and abuse of alcoholic drinks, might increase the disposition to paresis, and psychic injuries, overexertion of the brain and mental excitement have not rarely been placed side by side with these physical ones. In this way we have occasionally gotten so far as to make "Kultur" responsible for the appearance and the increase of paresis.

Trauma—So far not one of these statements has been proved except the one that civilization has caused the spread of syphilis all over the globe. We may, however, think it possible, after all the experience acquired during the Great War, that an *injury to the head* will sometimes shorten the period between the time of incubation and the outbreak of paresis. This contention has not been *proved* either, and might, of course, only be proved in cases in which the outbreak of paresis was *directly* preceded by trauma of the head. Such cases are rather rare, that these assertions have sometimes been wrong lies in the fact (it is similar with epilepsy) that the first paretic

attack has sometimes been taken for the cause and not for a symptom of the illness

Alcohol—As to *alcohol*, Kaes obtained in 1895 the result that chronic alcoholism is by no means of such very great etiologic importance, as some French scientists wanted to attribute to it, Junius and Arndt even found among their paretics fewer drunkards than among other mentally diseased, Mattauschek and Pilez noticed it to be quite exceptionally or never that a single one ever developed paresis among numerous syphilitic alcoholics, and Meggendorfer also asserts that the time of incubation is surely not shorter with syphilitics given to drinking. After a thorough study of the literature and of the statistical material of the Munich clinics, Plaut has also come to the conclusion that no one has succeeded in giving cogent proof of the importance of excessive drinking in the development of paresis.

Brain Work—We may leave aside this etiologic moment as a cooperative cause of the rise of the disease. As to *brain work*, Bismwanger wrote as late as 1894: "There is no doubt that paresis has to be looked upon as the consequence of functional overexertion of the central nervous system, first of all of the cerebral cortex." Also in Edinger's "Theory of Consumption," paresis has played a certain part. Thus Ludwig Stern has been able to state that paresis increases in proportion to the level of the cultural sphere, this statement is simply explained by the fact that, according to our experience, a brain worker who lives in a town or city is more likely to become infected than the one of the rural population of Baden, that furnished him the material for his comparison. Hoche says: "A particular profession predisposes a man to become a paretic only insofar as he is predisposed to become a syphilitic." Moreover, Meggendorfer has compared the incubation periods of 100 paretic mental workers with those of 100 paretic manual workers, without finding any difference.

Mental Emotions—The experience gained in war has shown us that *mental emotions* have the very same etiologic importance. Even the greatest (bodily and psychic) hardships have, as we may say to-day contrary to many an assertion made at the beginning, not influenced in any way either the frequency of paresis, the time of incubation, or the course of the disease. Divergent statements are to be explained by the fact that many mentally diseased of *all* kinds

died prematurely at home from underfeeding, and that in the field it was of course only the younger soldiers that became ill, so that the military statistics could not take into consideration paretics with a *somewhat longer* incubation time (Meggendorfer)

Kultur—Until a short time ago, one of the reasons that used to be particularly stressed, when civilization was accused as an etiological factor, was the increasing frequency of paresis in cultured countries. We will see that this statement presents a very moot question, but as long as it appeared at all probable we will have to examine the fact whether syphilis in itself was not getting more frequent. It is, of course, self-evident that civilization and above all big city life are causing syphilis to increase.

The following reason seemed for a long time to be a rather important one. Of the people among whom syphilis is very frequent, only those develop paresis in a severe form that have had their nervous systems injured by the refinement of culture, by the increasing competition in the economic struggle by cerebral and bodily overexertion, by the greed for enjoyments, but not only by syphilis alone. Thus, Moreira, in Brazil, has stated that all elements of the mixed population of that country—Europeans, Negroes and Chinese—developed paresis in the same degree, with the sole exception of the Red Indians, and he attributes this fact to the effect of civilization. V. Duhring, Deycke and Mongeri found in Turkey a good deal of syphilis and very few cases of paresis, and Kraepelin found in the lunatic asylums of Java not one native affected by paresis. Another disproportion in the frequency between lues and the development of paresis has also been found in Algiers, China, Japan and Abyssinia.

How difficult it is to correlate all these statements is, for example, visible in the reports of Gans, according to which paresis is not rarer among the natives of Java in proportion to the frequency of syphilis. Of three physicians who had made reports on the subject, one had found 33 paretics in 639 (native) patients, another one found 11 in 76 men and Gans found five among 55 patients. These are figures that correspond strictly to those obtained at our clinics. While spending two years and a half in Turkey, Fleischmann also found that paresis and tabes are much more frequent there than it had been supposed by the German literature, he quotes the explana-

tion of a native physician "The mentally diseased had formerly not gotten into the hands of foreign physicians, while native doctors had not been capable of diagnosing the affection, moreover, the patients had frequently avoided the asylums from fear of the conditions there" Gans gives a similar explanation about Java "The European does not get to know anything about most cases of mental disease among the natives Only when the patients begin to be considered very trying by those living with them, especially when they become a danger to everybody, then do people think of sending them to an asylum And in the Kampong (the quarter of the natives) people put up with a good deal more than do the members of European society" He continues "What is the real logic of the statement that in Java only one in about 50,000 inhabitants is found in an asylum? The number simply means that at the time being there was room for so many, some years later, after a large asylum had been built, it became crowded within ever so short a space of time and the number had increased to 1 25,000 "

One other fact has been stated by Gans, namely, that in the Javanese army fresh syphilis occurs about five times as frequently with Europeans as with natives Gans thinks that the cause might lie in the infection caused by *yaws*, which a great many Javanese experienced in their youth and that was a disease at least something like syphilis, or that the malaria that existed among all the natives had a favorable influence on syphilis

It is evident that it is just as difficult to get to know the facts as to find out their real meaning A man must know the conditions of a country very well, in order to be able to judge of the frequency of mental disturbances In this respect we have not even an accurate knowledge of the state of things in our own country As to foreign countries, we are liable to make many an error Thus, the greater frequency of paresis among the Croats than among the Bosnians had given rise to the conclusion that alcohol increased the harmfulness of syphilis with the Croats, whilst the Bosnians, being orthodox Mohammedans, were mostly abstainers Mattauschek has, however, proved that only one-third of the Bosnian population believes in Mohammedanism

Race —Later, *racial peculiarities* were expected to afford a clue But Croats and Bosnians, for example, are tribal relatives, and,

besides, there is no race, the members of which cannot become paralytics. Since *climate* can evidently not be looked upon as a coefficient cause, we cannot, in considering the differences that have actually been proved, help but think of the existence of another possibility to explain these things.

This possibility has at first been expressed by a theory that was rather popular ten years ago, *i.e.*, nations and races are growing older and "more used up" (decrepit), and become then more easily victims to all kinds of harmful influences. Especially, has "old Europe" generally served as an example to the very fanatic apostles of this doctrine. But it has been this example of the European nations, among whom paresis is at least not on the increase now, that has proved in this connection as well as in others that this rather naïve comparison between nations and individuals is a mere absurdity. Thus, the question regarding the relation between syphilis and race has completely changed its aspect in the last few years.

We know that syphilis has changed its character in the course of centuries. It is of relatively recent date that we hear that paresis is a form of expression of lues, and this late realization might possibly be the fault of the insufficient scientific endeavor with the insane in former days. It may be that in the struggle between the human body and the spirochaetes, the manifestations in which syphilis appears in the preceding generations are gradually changing. The reason for it might be sought on both sides. We know that the excitors of other diseases change their specific infectious character in passing several times through the human body, on the other hand, we have reason to assume that the relative immunity from certain infections which some men have acquired may pass on to future generations through the maternal blood. Thus it would at least be thinkable that paresis is the special (but perhaps not "milder") manifestation of a form of syphilis, the intensity of which has either been lessened or more effectively fought against by the body, Hoche's supposition that it will in this manner disappear some day, just as it only appeared in the course of the syphilitic infection of the people after the latter had lasted several centuries, seems to be quite possible.

To be sure, at least many of the facts that we have to consider here can, of course, also be explained differently.

Early Treatment—It has sometimes been asserted, for the last time by Wilmanns, that the early treatment of syphilis caused paresis. If we suppose this idea to be correct, it would, of course, explain the difference in the occurrence of paresis among civilized and uncivilized people. The former treat syphilis, the latter do not. On the other hand, even to-day we do not treat many syphilitics or at least not appropriately, and among uncivilized nations there are some individuals who come into touch with civilized methods, and are, therefore, treated in the customary way. This would not only explain the rule, but also the exception, and the recent decrease in paresis that seems to appear with us might be explained by the fact that it was only the particular inappropriate method of therapy which we practised for a long time that increased the predisposition to paresis, while the introduction of appropriate methods of treatment may have a favorable influence on the nervous form of syphilis.

On going to the bottom of these assertions and problems, we encounter very great difficulties. It is a fact that the treatment of syphilis, however sound and thorough it may be, does *not always* prevent paresis (compare Nonne, etc.) The general statement, that the early treatment has an altogether harmful effect, will have to be received with very great caution. There is above all a natural alternate effect between the gravity of the secondary phenomena and the intensity of the therapy, that might easily lead to errors. For instance, it had been attempted to prove statistically that the time between the incubation period and the outbreak of paresis was shorter with well-treated syphilitics than with those who were treated badly or not at all. The truth, however, is that the incubation time is shorter with people who become infected later in life, *i. e.*, with older individuals and that when older people become infected with lues, they are generally also ready to let themselves be treated more thoroughly. The statement that has recently been made by several people that vaccination might be considered as a cause of paresis in syphilitics is just as little probable as the hypothesis of Wilmanns concerning the harmful influence of mercury. Already to-day, we may say that this hypothesis is entirely refuted.

All our present experience is entirely insufficient to enlighten us on the differences existing between the frequency of the occurrence of syphilis and that of paresis. Also in the future, we shall have to

think first of the peculiarity of the infecting spirochæte or of the individual predisposition of the infected man, if we want to know under what particular conditions lues causes paresis

Constitution—Næcke announced years ago that a man was born to be a paretic, and only he who was so hereditarily affected would also in this respect be endangered by syphilis, he found in the different organs, which I will not enumerate here, signs of degeneration. Investigations of this kind are scarcely of any interest nowadays. Also the more recent attempt to find in the bodily habitus of some men a predisposition for the development of paresis—Richard Stern has called the muscular and adipose growth in width a habitus paralyticus—has not yet led to any result.

Nevertheless, the "born paretic" has recently reappeared. We find that certain persons do not possess the necessary forces of resistance which other persons do have—to prevent the progressing of a case of lues to paresis.

Lues Nervosa.—This hypothesis is, as we have already said, opposed by another one that was already defended by Hitzig, that paresis is caused by a special kind of excitor of syphilis, i.e., by a special spirochætal strain. Certain experiences—Brosius and Nonne have each informed us of one—that several patients who were infected with syphilis from one source of infection later developed paresis or tabes seem to strengthen this view. Lately this has been frequently doubted, because conjugal paresis has not been observed so very frequently as it would be if this supposition were true.

Nevertheless, the question of *lues nervosa* cannot be considered as solved. The assertions of Levaditi and Marie about a neurotropic and dermatropic spirochæte have, after Jalmet's further investigations, turned out to be incorrect, for the above-mentioned authors were misled by the so-called rabbit's disease. The investigations of Plaut and Mulzer have furnished in this respect very notable results. The two authors infected rabbits with two different strains of spirochætes, one of which corresponded to the so-called Truffi strain, while the other had been grown from a secondary syphilitic lesion. Whilst the first strain only rarely produced very slight changes in the spinal fluid and at that only after some time, the other (Munich) strain effected more frequently, earlier, and stronger changes of the meningeal membranes. The phenomena at the place of the

injection were, however, reversed. The animals infected with the Truffi strain soon developed a strong primary effect (local lesion), but it appeared late and only slightly in the case of the Munich strain.

We owe another important bit of information to the same investigators. They observed "that *almost all the rabbits developed meningitis* after their testes were injected with the cortex cerebri of paretics and they were able to transfer the disease to the testes of healthy rabbits with the same constancy through repeated vaccination with the brain and spinal cord of the sick rabbits." Histologically, they discovered pathologic changes of the cortex cerebri reminding one of human paresis. There existed again the contrast between the local reaction of the skin and the changes of the nervous system, whilst the rabbits that had been vaccinated with ordinary syphilis developed orchitis, there did not develop in the "paresis rabbits" either a local syphilitic lesion at the point of the injection or any manifestation of syphilis outside of the nervous system.

Modern theories emphasize the statement that it is just the strain which causes a weak reaction of the skin that endangers the nervous system particularly. In this way we might explain some observations that had been known for a long time, but had till then been explained in different manners. It had often struck the physicians that paretics either did not know anything about their syphilitic infection or had only undergone very slight secondary manifestations. Formerly the explanation of this phenomenon was sought in the fact that such cases which seemed to take a mild course had been treated a little or not at all, and that they had, *therefore*, developed "metasyphilis." Other authors were of the opinion that it was different forms of syphilis that caused either secondary symptoms or nervous affections. A third hypothesis makes the organism of the infected men responsible for these differences. Some men possess sufficient anti-bodies to shake off syphilis in its secondary stage, while others have to wait until the nervous system is infected. The "esophylasie" of the skin was said to play a great part in it, and the mild course of the skin symptoms was supposed to prove an insufficient formation of antitoxins in the body.

It has been tried lately to make one hypothesis of all three. After the investigations of Plaut and Mulzer, there can be no doubt that the special type of spirochæte strain is responsible for the develop-

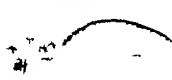
ment of the nervous sequelæ of syphilis. It would, nevertheless, be wrong to underestimate the individual preventive forces in this connection. Also, Plaut's own statements make it impossible to explain the whole question of paresis with a specific infection that is not only neurotropic to begin with, but predisposes directly to paresis. Plant has shown that the wives and children of paretics may for years be the carriers of the spirochætes that had been transferred to them by the sick men, and may yet possess a perfectly normal spinal fluid. This corresponds to the above-mentioned experience that the wives of paretic husbands become but a little more frequently tabetic or paretic than do other syphilitics, but yet more rarely than we ought to conclude from the assumption of a special paresis spirochæte, and from the frequency of lues among the family members of paretics, a fact which was proved a long time ago.

Plaut thinks that "the spirochætes which are originally from persons that have a chance of developing paresis (candidates for paresis), have, when transmitted to others, no obligatory neurotropic qualities which enable them to wield a lasting effect on the nervous system of the infected persons." He himself draws our attention to the contradiction existing between this clinical experience and those acquired by means of his experiments on animals. This contradiction might be explained by the fact that the spirochætes that are present in the brain of paretics (transmitted to animals by means of experiments), had not possessed their neurotropic biological individuality from the very first, but had acquired them only *late*, evidently years after the infection, and certainly at a time when the natural infectiveness of the paretic candidate, or of the paretic in general, may be considered as extinguished. Only the rare cases, in which the infection has come from a man who was already a paretic, might, of course, be compared with the above-mentioned experiments on animals. The cases of congenital syphilis of the children of paretic mothers might be looked upon as such examples. If the results of the animal experiments could be duplicated in men, then would such children be affected by neurotropic lues.

The whole problem is evidently a very complicated one. If the spirochæte assumes its neurotropic quality only in the body of an infected man, and if this *pallida* that has become a paresis spirochæte perishes with its carrier, the *constitution* of the patient will have to

play an important part in the pathogenesis of the illness. This is what the hypothesis of Hauptmann for the explanation of paresis emphasizes. Hauptmann starts with the contrast that seems to exist between the intensity of the skin phenomena and the endangering of the nervous system. He says, however, that "the minimal reaction (slight skin phenomena) is just as much in favor of the assailant as in that of the defender." If we have to deal with a strain which is slightly pathogenic for an organism in its secondary phenomena, then only a slight defensive reaction will be seen in the skin as well as at the spot of vaccination, and the nervous system is exposed to the dangerous influence of the spirochæte. In this case it is the same whether the organism does not produce any immune bodies, because it has not been irritated in the right way, or if it has not in itself the capacity to do so, even if the irritation is of the right kind. In both cases the spirochætes would not be digested intracellularly, as is the case with the usual skin reactions, but they might increase without any interference. It is clear that in this connection the effect of treatment which was begun in the primary or the secondary stage, might be considered in theory, for the therapy would, of course, help the organism to produce preventive forces. On the other hand, we might explain in this way the well-known experience that an insufficient salvarsan treatment has a harmful effect on the nervous system. It might be possible that the virulence of the spirochæte might be lessened in this manner and together with it the preventive work of the body. Hauptmann is surely quite right in advising us to study the whole complicated problem first on organisms that are not influenced by therapy.

In other respects Hauptmann's conception is so far a mere hypothesis. Klarfeld has already pointed out that such an experienced investigator as Matzenauer has come to a perfectly contrary conception of the importance of the secondary manifestations, according to him a serious course of syphilis in its secondary stage is always conditioned by a constitutional inferiority of the organism, whilst a mild course of the disease proves that a thoroughly healthy body can easily produce antitoxins. Fleischmann's opinion is almost the same, when he says that he has seen theluetice affection of the spinal system progress in non-treated cases of serious ulcerative forms of



lues, we could not believe any longer in the doctrine of the slight nervous affinity of lues with serious skin manifestations

All this is still indefinite and we are still very far from seeing clearly under what conditions paresis is produced. We can, however, assert unreservedly that we are able to attain our end, *i.e.*, the answer to the question, how it is that only a fraction of all syphilitics become parietic, by following the way indicated by Mulzer and Plaut, by Hauptmann and some others, and that the ideas developed in their works have already proved to be fertile.

EXPLANATION OF THE SYMPTOMS

Ever since we have known paresis, the progressive disturbance of the psychic capacities that goes on parallel with the gradual disintegration of the nervous tissue that transmits the functions of the brain has been considered as its essential clinical characteristic. A fact which has been observed rather rarely with other organic brain diseases, as, for example, tumor, multiple sclerosis, and even with arteriosclerotic and senile processes, appears here with great regularity, namely the psychic life is, to use Hoche's words, so to say, being demolished from above downwards, "the psyche undergoes a backward development which brings it finally back to the low level of the animal kingdom." Also here we come across localized symptoms like aphasia, apraxia and mind-blindness, they may, however, be lacking. A symptom which is never lacking is the *change of the personality*, which we may divide, in the medical history of the patient, into disturbances of judgment and of memory, feeling and will, which concerns, however, in reality the total performances of the psyche. In the case of paresis, the very parts of the brain, the integrity of which forms a necessary pre-requisite for all *higher* and *complex* psychical performances, can evidently not escape destruction, because of the very nature of the extension of the anatomic changes.

Besides these "axial symptoms" (Hoche) of paresis and besides the parietic *dementia* we observe in many cases "border-line symptoms," *e.g.*, anomalies of temper, disturbances of consciousness, epileptic attacks, katatonic syndromes, that aggregate more or less obtrusively to the picture of imbecility, and give a characteristic color to the dementia, just as they themselves have generally gotten, in the

earlier stages, a characteristic—paretic—impress by the weakening of the intellect. These “border-line symptoms” correspond to the exogenous forms of reaction which we came to know through Bonhoeffer’s work and which we meet with also in transient and curable organic diseases—in the latter case, however, without any traces of paretic metamorphosis.

The contrast between these two groups of symptoms has led Hoche to the conclusion that non-curable anatomic conditions were to be found only in the former, *i.e.*, in imbecility, while the “border-line symptoms” were produced only by toxins. (At the same time Hoche has admitted that long-lasting effects of poisons or toxins might finally produce definite anatomico-pathologic changes of the tissues.)

In pursuing logically his above-mentioned conceptions of the origin of paresis, Hauptmann has arrived at a somewhat deviating point of view. He explains paresis by a connection of two correlated processes, which are yet greatly independent from each other in their nature and localization, namely, a local effect of the spirochæte and an albuminous toxic process. In this way the inflammatory changes of the brain are traced back to the specifically vital manifestations of the spirochæte, the mere parenchymatous degeneration, however, to the fact that, according to Hauptmann, as we have already seen, the paretic, who is poor in antitoxins, is incapable of destroying (digesting) the excitors of syphilis intracellularly (in the skin) by specific antitoxic bodies, so that it comes to an *extra-cellular* fermentative decomposition of the spirochæte, which in turn leads to the production of substances of an *anaphylactic* character.

COURSE OF THE DISEASE

Period of Incubation.—Since the etiologic importance of syphilis has been ascertained, we know also that paresis has—like tabes—a rather long *incubation period*. The statistics of Junius and Arndt proposed three years as the lower and thirty-five years as the upper limit. More than three-quarters of the cases quoted in the statistics had only been found to be paretics *after* the seventh and already *before* the twentieth year after the infection. The authors have calculated that the average duration of incubation is fifteen years, a number corresponding almost exactly to the one recently stated by

Meggendorfer (151), and to the results of our own (Leipzig) material (149)

It is very remarkable that the incubation time of tabes and of paresis is decreasing with increasing age. Mattauschek and Pilcz found the ages given in Table I (in 422 cases). Meggendorfer's results are similar (782 cases) (Table II).

TABLE I

At an infection at the age of	Years						
	11-15	16-20	21-25	26-30	31-35	36-40	40-45
An incubation—time of	25.7	17.2	14.4	13.9	12.1	12.8	8.7

These observations seem to point to the fact that the resistive force of the organism is decreasing with age (Fig. 1). We cannot but be surprised that this decrease begins so early, and so the possi-

TABLE II

Age at time of infection	Years								
	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-60
Incubation time	23.7	20.1	16.3	12.7	10.7	9.2	8.0	7.3	5.0

bility that other factors might have influenced the statistical results has been thought of.

This is undoubtedly the case with the paresis of very old men. The reason why the illness is rare at this age is, of course, that most men become infected in their youth, and develop paresis long before they become old men, moreover middle-agedluetics frequently die of syphilis or something else long before their incubation time is over. They simply do not reach the upper infection time limit (of thirty-five years, *e.g.*, as mentioned in the statistics of Junius and Arndt).

Neither of these reasons explains why the shortening of the duration of the incubation period only appears with the older men, but also already at an earlier life-time—it may be seen in patients that become infected already before the twentieth year and develop paresis before the fortieth year. The reasoning is also not fool-proof, because the shortening of "the expectancy of life" does not develop

Fig 1

The average course of life of 1184 cases of General Paresis arranged by the date of infection (Hippocratic)

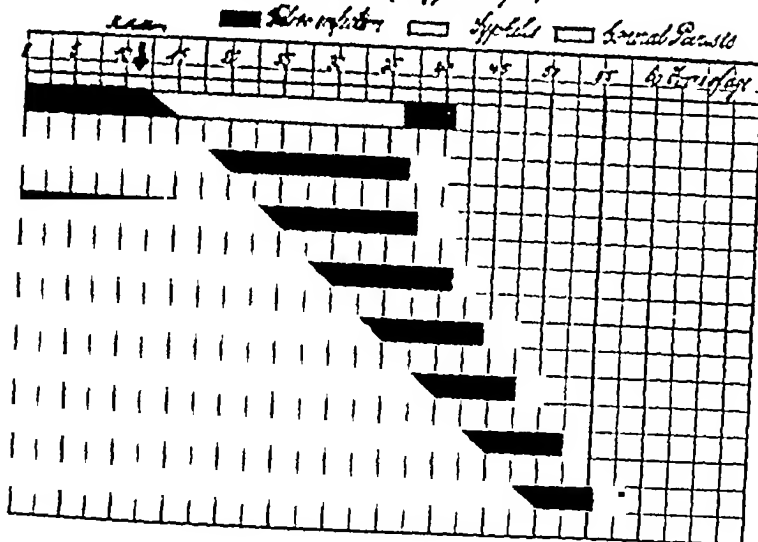
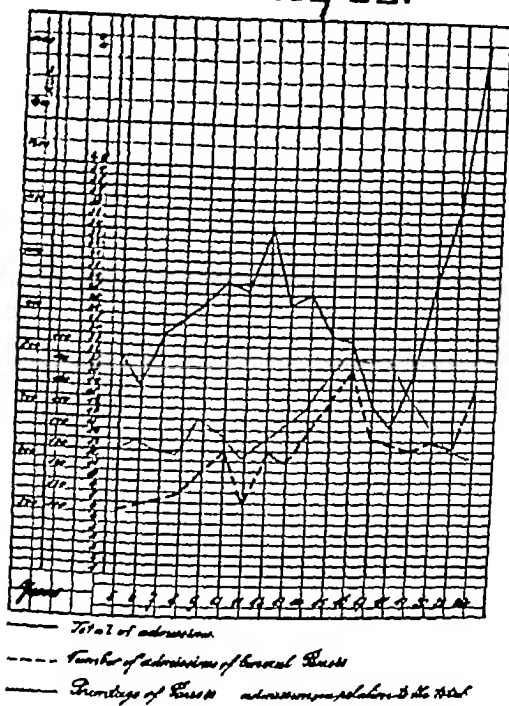


Fig 2

Admissions of General Paresis 1905/22.



at the same rate Especially Meggendorfer has proved by calculation that the difference in the incubation period of paretics that were infected either early or late cannot be explained by the gradually progressive decrease of the "expectancy of life"

All such statistics should, so to say, be followed by a note of interrogation, as we can never ascertain the exact beginning of paresis It is, therefore, probably more correct to calculate the duration of the incubation not from the beginning but from the end of the paresis Meggendorfer has also undertaken to do this work and has ascertained that the time between the infection and the end of the paresis becomes also the shorter, the later the infection has taken place We can, therefore, scarcely help seeing the reason of this manifestation in the fact that the decrease of the resistive force begins early (*i e.*, at about thirty years of age)

Duration of Illness—Junius and Arndt had already calculated the average duration of paresis to be two years and five months, Meggendorfer has recently said 27.5 months Besides the ascertainment of the average duration of the illness, it is, of course, important to ascertain the approximate or border-line value Galloping or florid forms, that lead to a rapid death in the stormy form of *Delirium acutum*, have, according to my impression, become rare in Germany I cannot remember having seen such a case for years Longer courses of the affection seem, however, to increase In his time, Mendel had seen in 95 cases, two cases lasting six to eight years, four lasting eight to ten years, and one of ten years' duration, in the last five cases he calculated the duration of the illness from the beginning of the first nervous (tabetic) symptoms In 418 cases, Heilbronner had observed ten cases lasting more than seven years, *e g.*, two of seven, eight, nine and ten years' duration, respectively, one lasting eleven and another one lasting eighteen years Junius and Arndt found only 123 or 13.7 per cent. in 895 cases in which paresis lasted for more than four years In 1903 Gaupp ascertained by means of the Heidelberg material that a duration of more than six years is rather rare and that statements about a long course of the disease, above twenty years and more, have to be dealt with cautiously

In the meantime we have heard diverging opinions But, since Gaupp has expressed his ideas in a very careful manner, they may still nowadays be considered as pretty incontestable Tuczek, Alz-

heimer, Friedrich Schultze and Spielmeyer have proved by their reports that it is certain that a case of paresis may exceptionally last even ten to thirty years. Thus Tuczek has described a case which Nissl examined anatomically some time later, in that case the illness remained stationary for nearly twenty years, and manifested itself before the patient's death by maniacal and delirious states, anatomically it proved to be undoubtedly a case of paresis. In 1913 Friedrich Schultze found in Baden-Baden a case that had been considered for fourteen years as "virtually cured," and by histological studies Alzheimer proved that "in the patient's brain there were remnants of former paretic changes." Alzheimer has examined anatomically another case in which the illness had been slowly progressing for thirty-two years, and Spielmeyer and Plaut have lately described together another case in which ten years and a half after the beginning of the first paretic disturbances, it was not possible to find any fresh processes of disintegration and inflammation beside the residues of a former paretic process. In such cases it is not only the tempo of the paretic progress that seems to have decreased, but also the affection seems to have been really cured. But also after a pause of twenty years we cannot pretend for sure that the illness would yet not have flared up again, if the patient had lived longer. Indeed, in the case of Spielmeyer and Plaut, there had, similar to that of Tuczek, reappeared shortly before death a psychosis that might very well be considered as a paretic one.

"*Stationary Paresis*"—The use of the descriptive word "stationary" to paresis is self-explanatory. A thorough and critical study by Gaupp and Alzheimer has already emphasized, as early as 1907, that this name is not well chosen. The paretic process may take a very long and slow course like many another one and exceptionally it may even be cured, but it is not in its nature that it *remains stationary*. But as it is possible that healing processes and new extensions may exist side by side in the same brain, it might be conceivable, *clinically* speaking, that an originally progressive illness does not make any more tangible progress after a certain period of time, and that there does not take place a still-stand of the morbid process, but simply a "defective cure."

Such cases have also been described from time to time in the older literature. Gaupp had, however, said in 1903 "*that the so-called*

stationary cases of progressive paresis were really not paresis at all These," he said, "are partly cases of diffused cerebral syphilis and partly a strange form of alcoholic imbecility, also other diseases, e g, traumatic dementia, arteriosclerotic affections of the brain and dementia præcox have, in a few cases, for some time exhibited the symptoms of a state that seemed to justify their being diagnosed as paresis "

We shall have to drop entirely the cases that became "stationary" and which were published in the time before serologic tests came into use Nor will we allow to pass nowadays this sentence which culminates Gaupp's paper "The course and the end of the illness are essential factors of the idea of paresis" Also in the later paper of 1907 (in collaboration with Alzheimer) Gaupp declared that most cases of a very long-lasting paresis have been falsely diagnosed In all the hospitals of Bavaria and Wurtemberg together he found only five cases that lasted more than eight years which he recognized to be paresis, but also these five cases showed different peculiarities and *were, according to Gaupp's opinion, not sufficient to prove with certainty the existence of a stationary paresis*

As I have said, it seems as if recoveries with a defect and extraordinarily long courses of the disease had recently been getting a little more frequent We can, however, not prove it principally because we do not know if our diagnoses may be compared in every respect with those made before It is nowadays a matter of no dispute that of all the pareses described in the works of some time ago, we must deduct all the cases which are not with certainty based on lues, it has, however, become doubtful in the meantime, if we are really capable of distinguishing clinically all cases of "diffuse cerebral syphilis" from paresis itself

Moreover, the therapy of paresis has become more active It is not quite easy to say to-day whether the course of the illness has changed from internal reasons or whether the introduction of more appropriate ways of treatment and their energetic application have not caused now a milder process The historical fact, that a change of the course of paresis was once ascertained years ago, teaches us to be very careful in this respect Such a very experienced physician as Mendel maintained, in 1898, that the classic form of paresis, as opposed to the simply demented one, has been more and more decreas-

ing In 1880 he had counted in 180 cases treated by him, 55 or 30.6 per cent belonging to the typical forms, but had not seen between 1890-1898 more than 24 or 12.4 per cent of typical cases. The demented form had, on the contrary, risen from 20.6 to 36.1 per cent. In 1900 H. Behr had made similar statements based upon the Hildesheim material. Jolly had opposed Mendel's views, also Furstner, Raecke, Gaupp, Junius and Arndt could not confirm them either. Especially the comprehensive statistics of the last two authors will not cast any doubt that at Dalldorf the simply demented form of paresis did *not* increase until 1908, when compared with the other forms.

If we are to-day again under the impression that the mildly progressing cases are increasing in number, we shall have to think first of exogenous influences and then of defective statistics. Hoche says justly that during the last few decades preceding the war, many cases of mild psychosis and, therefore, many mild pareses that had formerly been treated at home, were sent to hospitals and similar institutions. This explanation will not suffice for the period *after* the war, the family members try nowadays to keep the quiet patients at home. On this supposition we ought to meet in the hospitals and infirmaries relatively *many severe paretics*. As to my own impressions, I cannot but repeat that I have had the contrary experience. At the same time that the course of the simply demented form seems to last longer, remissions become more frequent and last longer, and the typical cases in which the patients gradually become imbeciles, show at least a somewhat more flattened curve.

It will last some time before these more or less subjective impressions will become objective facts through the means of statistical material. Also then the comparison with former investigations will still be difficult, on the one hand because the present economic conditions have a decisive influence on the composition of hospital cases, and on the other hand because our conception of paresis has become a different one.

FREQUENCY

We have to struggle with the same difficulties when we want to get a clear idea of the frequency of paresis. A. Pilcz has written in 1922 that in Vienna the number of paretics of both sexes admitted

into the hospitals was steadily decreasing, especially from 1920-1922, this decrease had been striking. This decrease of the frequency of paresis was manifest in proportion to the total number of the admitted cases as well as to the total number of the population. It had chiefly taken place in the last five years (1917 to 1922), whilst the frequency had increased from the first to the second five-year period (1907 to 1912). It was, however, *not* possible to observe a similar sinking of the curve in the case of the material of the insane hospital at Mauer-Oehling (with patients coming mostly from rural districts).

Also Bonhoeffer has pointed out that the decrease in the number of the cases of paresis had attained a considerable percentage among the Berlin cases. They admitted there (this is the percentage of paretics as against all the patients admitted) the number given in Table III.

To say it plainly. A downward tendency began in 1913—a result

TABLE III

	% Male Paretics	% Female Paretics
1913	13.5	6.25
1914	12.3	6.09
1915	6.6	4.6
1916	9.2	3.0
1917	8.1	4.8

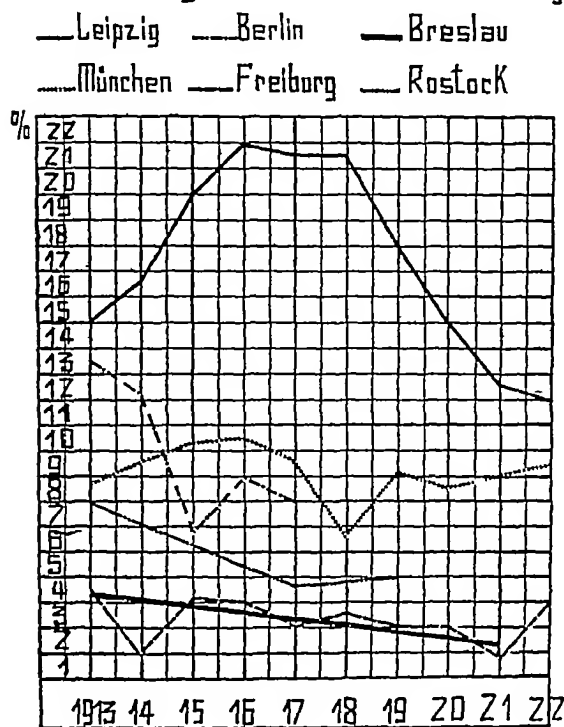
which we ought to take into consideration because, as to the point of time, it is essentially different from the one obtained at Leipzig.

At Leipzig the percentage of the paretics admitted began to rise in 1911, reached its peak in 1916 (22 per cent), remained so until 1918, and has been decreasing from that time on, rapidly and equally (Fig. 2). The present percentage of 11.2 (for 1922) is even below that of 1905 (12.9) and was only reached once before in 1911. Before we shall attempt to criticize this curve (which seems to me to be very fit for a closer investigation, because the Leipzig clinic was not a reserve hospital during the war and did, therefore, not change its character), I have to mention first of all that our numbers were not confirmed everywhere, *e.g.*, at Munich and Freiburg. The question, whether they were not due to casual influences, arises, therefore, once more.

We all know that the alcohol psychoses had decreased from 1914 to 1918, but that they increased afterwards considerably. This made, of course, the percentage of the frequency of other mental diseases increase a little. On the other hand, the number of psychopaths admitted augmented everywhere at the same time, so that they ought

FIG. 2

Admissions of General Paresis. (Percentage of the total of admis.)



to have made up for the absence of alcoholics. Moreover, we have already seen that the economic misery of the period after the debacle of the empire precluded the admission of many patients who would formerly have been sent to hospitals. But now we might ask, unless the course of paresis should have changed, why the same economic conditions did not prevent a great increase in the *total* number of patients admitted into hospitals. It is not possible to weigh simply the relative decrease of paresis

against that increase, because the *absolute* number of paretics had also decreased until 1921, and this decrease had indeed begun in 1916. The total number of the patients admitted into the hospitals has surpassed that of pre-war days only since 1921—the cause having been a change of the management (a greater admittance of psychopaths of all kinds), and from that moment on the absolute numbers of paretics has increased, whilst their share in the percentage of the total number of hospital patients is still falling.

We might explain all the differences by saying that paresis is getting rarer just now because "those who would have become paretics" by this time were killed in the war. As to Leipzig, this explanation will not do, because the increase until 1916 as well as the decrease until 1922 equally concerns both men and women.

Finally—and this seems to me very important for other reasons—the same decrease has been observed in the case of *tabes* (at the Leipzig medical clinic), as the numbers in Table IV will show.

This decrease of *tabes* is still more striking, if we consider the male patients by themselves, their numbers having sunk from 1911

TABLE IV

	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
Per cent	1 40	1 12	1 00	0 98	0 97	0 70	0 82	0 69	0 85	0 76	1 06	0 88

to 1922, from 1 05 to 0 52 per cent. The lowest level (0 69 per cent) for men and women was already reached in 1918, whilst the decrease became already noticeable in 1912.

These variations observed in different years are important, because we find the same decrease of paresis by comparing the figures of different German clinics. We know already that in Berlin the curve began to sink as early as 1913. At the same time such a downward tendency (from 4 29 to 2 39 per cent in 1923 in the case of men and from 2 19 to 1 22 per cent in the case of women) became noticeable at Breslau (Struzima), and also in Mecklenburg—Schwerin (Rostock and Sachsenberg) the numbers decreased already in 1914, according to Adolf Koch's reports.

There, however, the curve reached its lowest level already in 1917, as Fig 3 (facing page 56) will show, and rises again from that year on until 1919. The entirely different situation in Munich and Freiburg i Br., about which the corresponding curves give the necessary enlightenment, is still more striking.

We cannot discern here any regular law, not even if we calculate only the percentage of female paretics (by taking the war into consideration). I confess that it does not seem possible to me so far to clarify these contradictory results. If we leave first aside the seasonal displacement of the curves in Berlin, Breslau and Rostock on the one hand, and in Leipzig on the other hand, then the question

arises why the decrease of paresis is not noticeable at all in Munich and Freiburg. As Munich is also on the negative side, the difference cannot be caused only by the material coming either from a city or a rural district. The next explanation, that the introduction of an appropriate salvarsan treatment has a favorable influence on the frequency of paresis, is greatly questioned by these topical differences. Besides, we have to add that most paretics who are treated with salvarsan (or still better with neosalvarsan and quite energetically at that) are still far from having reached the middle of the incubation period of paresis. It might, however, be explained on the basis that the increase until 1916 might first have been a deception, caused by the introduction of the Wassermann reaction and of the lumbar puncture, *i. e.*, by an improvement of our diagnostic expedients, and that afterwards, a real increase might have been caused by an inappropriate salvarsan therapy which hastened the outbreak of paresis, the decrease since then would only be the consequence of the increase, inasmuch as the paresis candidates who would appear on the scene now, became prematurely ill because of the ineffectual salvarsan therapy.

I am far from believing that this hypothesis is a definitive explanation, but it seems better to me than, for example, that of Struzima, who wants to deduce the (seeming) decrease of paresis first of all from the economic difficulties of the time. It is certainly true that to-day the family members try to keep the patients at home as long as possible, but we cannot understand why the effect of this state of affairs with respect to paresis should also not be felt at Freiburg and Munich. As the total number of the admitted patients has considerably increased, at least at Leipzig, we ought at least to add to Struzima's explanation the fact that the course of paresis is gradually getting milder. Also then—even if we think first of all of the effect of salvarsan—it is not clear why the decrease of paresis begins later at Leipzig than at Berlin, Breslau and Rostock.

The final supposition that the topical and time differences in the frequency of paresis, which we have learned to know, might be traced back to the endemic appearance of certain neurotropic strains of spirochætes, this supposition which Plaut discusses in another connection and for which he gives good reasons, can in this paper

only be hinted at with the greatest reserve It cannot yet be proved at the present time

TREATMENT

It is well known that paresis was formerly considered as incurable Leredde explained long ago, however, that metasyphilis was not cured because it was not treated long enough and energetically enough Amongst others, Steyerthal had maintained that therapy had a favorable influence, but he added that he has not yet seen a really or probably cured case of paresis among the cases that he had observed Recently Nonne has reported some patients in whom remissions of a rather long duration have come about, partly due to the influence of therapy Nonne himself is inclined to speak about cures and not about remissions, and his cases have indeed become again socially useful beings One of these cases has been in such a favorable state for three years, another for four years, and in a third case, that of a man who has behaved normally for more than twenty years, we ought to ask for a much more exact statement of his psychic condition before maintaining that this is a cure without a defect Another question is whether we ought not to demand a histologic confirmation of the diagnosis, before speaking of a *cure* of the paresis

Non-specific Therapy—Already Hippocrates and Galen knew that febrile affections had sometimes a good influence on the course of paresis In more recent times (1854) Jakobi had artificially produced abscesses in patients who were becoming imbeciles, and later Ludwig Meyer made similar experiments, especially with paretics According to that author, eight cases in fifteen were said to have been cured by this therapy (1877) In 1902 Schule recorded a case of undoubted paresis that was cured after a bilateral pneumonia and a grave otitis media with profuse suppuration, and who had afterwards remained in good health for twenty years From the same year dates a report by v Halban, who after reviewing the whole literature on the subject came to the conclusion that processes connected with profuse suppuration could also have a favorable effect especially on fresh cases of paresis, that take a maniacal course

Tuberculin.—Thus the soil was prepared for a therapy, the introduction of which we owe chiefly to Wagner v Jauregg This investi-

gator began to apply tuberculin, and already in 1887 he reported favorable results. In 1911 and in 1913, Pilcz reported the catamneses of 86 cases treated in this manner. In 1911, 23 patients had improved so far that they could be considered as capable of earning money and of doing business, the improvement of nine others advanced less rapidly, and in 20 cases the affection came at last to a standstill. In 1913, 21 of the patients treated from 1907 to 1909 were still alive, seven were capable of doing their professional work, four were socially capable individuals and five were at least in good physical condition. They had, however, been an especially carefully selected group of paretics in the beginning stage of the illness.

Also serologically Pappenheimer and Volk have been able to confirm the effect of the tuberculin treatment. They found a diminution of the lymphocytes in all the fifteen cases examined, and also a diminution of the globulin in eleven cases, the Wassermann in the spinal fluid was favorably influenced eight times, the blood Wassermann, four times, three times the cellular contents became normal, the globulin reaction became once negative, twice doubtful, the Wassermann reaction in the spinal fluid became three times negative.

(In the further course of the treatment, Wagner v Jauregg has combined the tuberculin with the mercury treatment.)

Natrium Nucleinicum—Later O Fischer and Donath have tried to produce fever and hyperleukocytosis by the injection of *natrium nucleinicum*. In this manner twenty-one paretics improved, according to Donath, so far that they were capable of doing all their work, and only in six cases did the therapy show no effect whatever. Further trying out of this therapy has unfortunately not yielded similar good results.

Malaria—On the contrary, the good results which Wagner v Jauregg has again reported with *malarial infections* have been confirmed by several other investigators.

Wagner v Jauregg's method is as follows: "Blood which had been taken out of the vein of a malaria patient during a febrile attack was injected subcutaneously in the back of the paretics under treatment. After an incubation time which lasted from six to thirty-one days, the inoculated patient developed attacks of malaria that showed

the typical symptoms, either of the tertian or of the quartan type, with chills, sweats, and temperatures of 40 to 41 degrees. After about eight attacks of fever, the malaria is cut short by giving the patient during each of three days 0.5 gm. quinine and at the same time he gets six injections of neosalvarsan at one-week intervals. Shortly after the first dose of quinine, the malarial parasites usually disappear from the blood."

Wagner v. Jauregg says that this therapeutic measure yields the best results of all the methods of treatment for paresis that he has ever seen. If the illness has not yet lasted long, one might predict with tolerable certainty a complete and energetic remission. Already in 1921 the Vienna clinic could boast of more than a dozen cases in which the patients could successfully go back to their professional work. In no case did a patient, who had entirely recovered, have till then a relapse. In such a case, the reaction of the serum and of the spinal fluid need not be parallel with the clinical manifestations, but may still remain positive a long time after the remission occurred. Wagner v. Jauregg had made this same observation also with the tuberculin method of treatment. In 1921, Weygandt and Kirschbaum have, among others, reported their experiences in checking the results obtained by Wagner v. Jauregg. According to Weygandt, he (Wagner v. Jauregg) obtained 88 per cent. remissions of such a degree that they were almost capable of doing their professional work, by treating them with malaria, of these remissions 68 per cent. were very good ones and 20 per cent. rather mediocre ones. In 1922 Weygandt reported a total of 69.5 per cent. remissions, 50 per cent. of which he is supposed to have obtained by means of the malaria cure. The results obtained by Kirschbaum, with material taken from the Hamburg Hospital, and in which he employed *Malaria tertiana*, *Malaria tropica* and relapsing fever, are similarly favorable (Plaut and Steiner introduced the relapsing-fever treatment). The author reports fifty-one cases and divides them into five groups, the first group of fourteen, in which he obtained a remission, enabled the men to do their professional work perfectly well with only very slight psychic disturbances, the second comprises sixteen cases that could also do their entire professional work, but still showed slight defects, the patients of the third group could work when being watched, and

their number amounted to seven, two groups of seven cases each remained either unchanged or died after further progress of dementia

When dividing these favorable results according to the single types of malarial treatment, we find

<i>Malaria tertiana</i>	34 cases with 21 remissions
<i>Malaria tropica</i>	9 cases with 7 remissions
Relapsing fever	12 cases with 9 remissions

Kirschbaum has also said that fresh paretics offered a better prognosis with the treatment than those that had existed for two years or a longer time, and that the therapy was not advised in the case of aged paretics, while it was especially favorable in the case of younger patients

The remissions, that appeared sometimes during the fever treatment and afterwards, and sometimes even many months afterwards, have also here occurred mostly in the maniacal form of paresis

All these statements are of value only if we have plenty of material for comparison Kirschbaum writes that at Hamburg they had observed, from 1911-1915, an average of 11.4 per cent. remissions, and that in 1912 the maximum had been 13.6 per cent. If we deduct the percentage of spontaneous remissions that are to be expected from those actually obtained by therapy, there remain still 4.68 per cent. improvements, that are to be credited to the fever therapy

At the Dalldorf Hospital, Bratz inoculated thirty-eight patients with malaria and noticed that he obtained sixteen perfect remissions, these became capable of following their profession. Among his patients there were advanced cases and incipient ones. According to Bratz, the success appeared three months after the recovery from the fever, and rarely after the eighth or ninth febrile attack.

My own experiences with this therapy conform themselves entirely to those of the Vienna clinic. With 33 1/3 per cent. we obtained long-lasting and good remissions. I cannot yet say if there will appear differences between the malaria treatment and that with relapsing fever, as the series of investigations of this latter treatment is not yet large enough. It seems to me that a great advantage of the malaria treatment lies therein, that it can be interrupted at any time at will.

At any rate we shall have to continue our efforts of fighting against paresis. If we compare the results we have obtained to-day

with the general resignation that reigned twenty years ago, they seem very great indeed. That we may speak of a real "cure," even in some exceptional cases, seems very doubtful to me. It is here the same as with spontaneous remissions. In the case of an educated patient, of whose intellect the family members and the physician expect more, the result which is obtained appears much less than with primitive natures, living under simpler conditions. This is a point of view that we cannot entirely neglect in individual cases, when we decide what therapy we are to apply. There are cases in which the occurrence of a remission is for all the persons concerned nothing but a prolongation of the misfortune caused by the paresis.

The results obtained thus far are, however, nothing but a stage on the way which, we hope, will some day lead to the effective cure of paresis.

MODERN SOCIAL CONDITIONS AND THE VENEREAL DISEASE PROBLEM

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ONE need not be in entire accord with the freudian theory that the predominating force in life is the sex urge, to acknowledge its importance both in the life of the individual and in the social scheme. Whether indulged to the full or inhibited, it has a powerful influence on the activities of the individual. So too the attitude toward this instinct of that agglomeration of individuals we call society—whether it be manifested as a desire to curb its free expression, or whether, as with us to-day, there is exhibited a more or less shame-faced tendency to let it function almost untrammelled—shapes many of our institutions and has a far-reaching effect in many fields. In these days of exaggerated sex consciousness it is necessary to be *only mildly analytical to appreciate these facts*. One may not avoid the subject if one would. Writers of all sorts—newspaper, play, scenario, magazine—harp constantly on the one string.

It is not to be denied that a great change from the stern code of our fathers has taken place in sex matters in recent years. Promiscuity is undoubtedly on the increase. Why should this be so? Possibly it is because in this highly prosperous country of ours, the majority of us are so far removed from the pinch of want that we have an opportunity to forget the food urge and are therefore inclined to dwell rather too much upon our sexual emotions.

While it is true that our social order grows more complex each day, this fact is comprehended by the thoughtful only. To the average normal person, were he inclined to make the comparison from his limited viewpoint, the world would appear to be growing less complex. Provided he is able to find his little niche in the world and to keep out of the hands of the police, his life is one round of pressing buttons, pulling levers, following a narrowly prescribed program, and in general making use of conveniences and short-cuts and comforts that have been prepared for him by his mental superiors. He himself need have only intelligence enough to carry on

some monotonous task and to make use of the social facilities within his reach, from the electric light button to the benefits of the United States Public Health Service, let us say. It would almost appear, in other words, that our industrial efficiency—an efficiency for which a relatively few powerful minds are largely responsible—has had the effect of simplifying the struggle for existence for the average man, and even for the person somewhat below the average in intelligence, so long as there exists in him no marked character defect or physical handicap. Possibly this freeing of the average man from the need of taking any independent thought for the morrow beyond the simple one of seeing that he holds his particular job, may have somewhat to do with the exaggerated sex consciousness so noticeable to-day. Our hard-bitten ancestors who wrung a bare subsistence from the stubborn soil or the stormy sea, and whose womenfolk had their days filled to overflowing with self-appointed tasks varied as the day was long, had but little time or opportunity for rapt contemplation of their sex urges. That the sex instinct had its rightful place in their lives, their numerous and sturdy progeny testifies. Doubtless Freud's theory, had it been promulgated among them, would have fallen upon deaf ears. Its time was not ripe. With hay to bring in and food to prepare and fish to be caught and wood to be put in for the winter and homespun to be woven, and with no buttons to press and no levers to pull to help along at these tasks, but passing attention would have been vouchsafed to a theory that appeared to relegate to the background the outstanding activities of their busy lives.

So, then, it may be argued, it is our industrial efficiency that is responsible for our present-day sex consciousness and for the exploitation of the sex instinct so noticeable among us. For the sex instinct is exploited, cold-bloodedly and ruthlessly in every field where its exploitation will bring in monetary returns. Where fifty years ago prostitution stood almost alone as a business that exploited the sex instinct, to-day it is entitled to no such exclusiveness.

Observe our modern dance halls, where the populace seeks its relaxation. See the warmth of coloring, the dimmed lights, the beautifully polished floor, hear the languorous sigh of the saxophone, the monotonous, teasing insistence of the jazz music, reminiscent of nothing so much as of the dance music of primitive man.

And it is no accident that modern dance music smacks of the jungle and the sex dances of the barbarian. It is cunningly and consciously devised to that end, so that it shall appeal to the sex instinct. When our young people pass before us in one of these dance halls, cheek to cheek, in close embrace, can we doubt there is a reaction akin to that obtained by the savage when he performs his tribal dances to the monotonous tom-tom of the tribe musician? Does this type of amusement tend to encourage promiscuity? We know it does. So it becomes definitely related to the venereal disease problem.

As to the modern dress for women, it would be ungracious in the extreme to find fault with it, since it embodies all the advantages for which dress reformers of two generations have striven. There is no doubt of the comfort and convenience of the new clothing for women. The elimination of corsets and petticoats, the shortening of skirts, the introduction of the sandal, all these must make for health. Yet these changes in the fashion (for this is all they are) merely reflect examples set in another field of sex exploitation, namely, the theatre and the silver screen. Even a careless observer may note the advantage that is taken by many of our young women who commercialize their charms, to augment their natural appeal by the aid of clothes or rather the suggestive lack of them. Formerly even prostitutes were compelled to be discreet in the exhibition of their persons in public. At present, when their desire to wear suggestive dress may be indulged unhindered, because such dress has become a commonplace, one may at times see startling displays.

Is it too much to conclude that the prostitute's sphere of activity has been enlarged by means of such dress—or undress? If we may so conclude, again we have a definite connection with the venereal disease problem.

In charity to many of our young women it is well to bear in mind, when one is made aware of these tasteless exhibitions of the unclothed body and the injudicious use of cosmetics, that fully 50 per cent of our population are mentally children and will never be aught else. It is useless to expect from them the reactions of an adult to the suggestions offered by the stage and screen.

The large financial returns to be gained in the moving picture industry have opened the way to a wholesale exploitation of the sex instinct. It has appeared to those interested in the business

that a "sex" play was always "sure fire", that is, the box office receipts from one of these plays are always satisfactory. To those managers who have not the insight nor the enterprise to build up a following on a basis just as sound but less objectionable, the sure gains to be made from a picture exploiting the sex curiosity of the public have appeared to be sufficient excuse to ignore the decencies in this regard. These sex plays do their part to accustom our youth to be less critical of sexual lapses and so too have a share in paving the way to promiscuity. That financial success in the picture industry is not dependent upon sex exploitation is proved by the careers of half a dozen of our most popular screen artists.

So, too, the speaking stage has descended more and more to the level of dragging in, on the slightest excuse, allusions and witticisms having a sex coloring. Jokes, often more vulgar than humorous, on the subject of promiscuity and the commercializing of sex, are the rule in our best vaudeville houses and meet the approval of a distressingly large part of the audiences. Not all the persons who laugh loudly at suggestive witticisms emanating from the stage are in the habit of interlarding their conversation with such bits. The contrary is doubtless true. Yet the continued suggestion has its effect upon the character after a time. It furnishes a background that helps to weaken resistance when the temptation to sexual immorality presents itself. The vulgar witticisms of the stage that belittle every ennobling sentiment and every aspiration that lifts man above the brute cannot but have a deteriorating effect upon the moral nature of a large portion of our mentally immature population.

Our magazines, novels and newspapers are not free from the accusation of exploiting the sex instinct. In an output that is in many ways most creditable, there is found a fairly high percentage of writing that has no other claim to existence than that it affords a form of sexual gratification. Sex-laden magazine stories and novels are eagerly devoured for the vicarious sex enjoyment to be extracted from them. Sexual gratification afforded in this manner paves the way for sexual promiscuity when the compunctions of conscience have been lost, or the fears of consequences dispelled.

The relatively lax public attitude toward sexual indiscretions has also added complications to our liquor problem. Sexual promiscuity leads quite simply to the frequenting of places for the illicit

selling in liquor Young women of a social class that a generation ago would not have thought of entering a saloon, now may be found in numbers at the resorts of dealers in illicit liquor, unabashed, drinking like their male escorts, some of them, and enjoying, besides, the sensation—so dear to the child mind—of eating forbidden fruit. Conversely, the sexually inexperienced young persons who are led by curiosity to visit these places, soon add sexual immorality to their other misdeeds Drunkenness has ever been a prolific source of sexual indiscretion.

There is no desire on the part of the present writer to belittle Freud's contribution to the youthful science of psychology Its fruits are already being gathered in lines of research opened up by him. But one evil it has brought in its train The theory has been distorted and exploited by Freud's rabid disciples and also by self-seeking persons whose sole aim is to use for financial profit the curiosity of the public regarding matters of sex. Some of the most flagrant of these offenders have finally attracted the attention of the police authorities One does not see or hear so much of them of late Yet the mischief has been done The effect of the broadcast dissemination and distortion of the freudian theory has been to break down restraints on the sex urge in those social levels where we ordinarily expect to find the highest types of sexual ethics Some of our universities have introduced into the classroom the study of freudian psychology with its exaggerated emphasis, to the detriment of the immature minds of many students It would seem that these young persons, reared in an atmosphere created by the ethics of stern restraint that were the strength of our forefathers, hailed with joy the teachings of Freud as an escape from the sexual repressions and inhibitions to which they had been trained To gain freedom for the sex urge they were apparently willing to throw even religion overboard, to look upon this great moral force and spiritual balm as a codified system of sex symbols Indeed these mentally myopic neo-freudians perceive every ethical and social institution as but an expression of sublimated sex instinct

In this social level the breakdown of restraints against promiscuity is not so closely related to the venereal disease problem as it might be Due to the relatively high level of intelligence, there is a stronger realization of the danger of venereal disease and a cor-

respondingly greater use of chemical prophylaxis or other safeguards. However, it is always to be regretted when a portion of society which should serve as a model for those less favored, forgets its responsibility in this regard—when it ceases to have for its motto “Noblesse oblige.” The bad effects of such an example, while often untraceable in detail, are powerful in the aggregate.

Our industrial efficiency has had another effect that is closely related to the venereal disease problem. In a highly industrialized country like our own, where so much is produced primarily to sell, rather than merely to use, we are reminded a thousand times a day, by billboards, by the advertising pages of newspapers and magazines, and by the possessions of our more affluent neighbors, of the desirability of owning things. Are we susceptible to suggestion and readily influenced by our environment? Then we are likely to attach great importance to the possession of material things to the detriment of other values. It is in this manner that our full-flowered industrialism has affected marriage. Young persons postpone marriage because to the majority of them the material sacrifices they must make to establish a home and rear a family are all too apparent. Some marry but deliberately refrain from rearing a family, the wife often continuing her gainful occupation with no intention of leaving it, soon or late. Stripped of its most important cause for being—the bearing and rearing of children—the institution of marriage is greatly weakened. Many of our young people, without thus analyzing the situation, feel the laxity of the bonds that unite them in a childless marriage. Sometimes they drift apart, as our crowded divorce court calendars show. Very frequently the next is sexual promiscuity. Others with less idealism, who face the situation a bit more cold-bloodedly, do not trouble to marry at all. Due to their natural instability and purposelessness, they drift from one liaison into another. Sexual promiscuity, then, is increasing as real marriage declines. In so doing it presents a venereal disease problem more difficult to deal with, in many ways, than the old one of simple public prostitution. There has been an increase in the ranks of the occasional prostitute—the young woman who augments her industrial earnings by commercializing her sex favors, or uses them to obtain entertainment and luxuries ordinarily out of her

reach In the nature of things, it is exceedingly difficult to guard against the venereal disease menace these persons represent

The problem of public prostitution we have always with us The characteristics of the woman who resorts to public prostitution are well known She is generally young in years, she has been a neglected child, whether rich or poor, her mentality is always defective and her health also Repeatedly the histories of prostitutes show, in the first twelve years of life, want, neglect, bad environment, lack of recreation and lack of schooling Alcoholism, tuberculosis or syphilis often figures in their ancestry Out of 100 prostitutes examined in a recent survey, only seven were apparently normal Thirty-eight were feebleminded, with mental ages ranging from 7 to 9 6, 43 had mental ages from 10 2 to 12 They have usually been backward in school, incapable of applying themselves, lazy, untidy, stubborn and highly nervous and excitable Their inadequacy is not wholly dependent on impaired intelligence, their whole make-up is faulty

Since we know what the prostitute is, we are in a position to do preventive work—always best and most economical The adjustment of delinquents guilty of a first or second offense is sometimes possible When the scales have fallen from their eyes and they begin to weigh the consequences of ostracism, the sacrifice of health, the risk of a venereal disease and the general dissatisfaction incident to sexual error, a reasonably intelligent girl will sometimes grasp the opportunity to reform. With the hardened wrong-doer it is otherwise

The guarding of the defective girl who is likely to become a prostitute should be begun in childhood There should be a closer study of our school children and psychopathic laboratories should be established for the purpose While there exists a demand for the prostitute, girls who are unable to make an adequate social adjustment will drift into this oldest of professions Early segregation of the unfit is therefore essential if we are ever to find a real solution of the problem of prostitution.

In the eighteenth century there was a notion prevalent that all men were created free and equal We know better now Not all men are born free, nor are they born equal, one to the other Not all may reach the heights Some are heavily handicapped in the race The ball and chain of heredity hinders their every step Small

wonder that individuals so circumstanced feel that the hand of every man is raised against them. Is it too much to look forward to a time when every community will take care of its social misfits, to keep them from becoming a social menace? Surely not. There is enough intelligence and good-will among us. It only waits to be organized.

The delinquent remains a child in character if not always in intelligence. He needs, therefore, the guiding counsel and protection that a child needs. When he reaches the age of eighteen or twenty-one years it does not follow that he is capable of assuming the responsibilities of an adult. The community must continue to stand to him in the relationship of parents, to guide and control him. At present the community stands in the position of a parent who has to foot the bills run up on his account by an irresponsible child.

Besides this remedy of segregation and control of the unfit, there are two other remedial and palliative measures for the control of venereal disease. These measures are chemical prophylaxis and sex education.

As to chemical prophylaxis, wordy wars have been waged by hostile camps who had each the same benevolent aim of preventing venereal disease. Many persons will admit that the dissemination of information concerning chemical prophylaxis will have the effect of reducing venereal disease. Yet they will contend that this decrease in venereal disease will be dearly bought, for they argue that great numbers of virtuous young men and women will be tempted to illicit sex indulgence because of the immunity from infection that chemical prophylaxis confers. They feel that to approve of chemical prophylaxis means to condone and tolerate sexual promiscuity.

Views such as these are based on what to the present writer appears to be an erroneous belief. That the majority of our citizens are sexually chaste only because they fear venereal disease infection. Granted that the sex instinct is powerful, second only to the instinct of self-preservation. Yet it is not synonymous with outright eroticism or with a desire for promiscuity. Character peculiarities that have nothing to do with fear of venereal disease infection—traits handed down to us from our long line of ancestors—are quite as effective as fear could be.

Moreover, it is the person of normal or superior intelligence who can be best motivated by fear. Such a person will take the time to

consider the matter carefully. He will realize the danger of infection from promiscuous intercourse and will build up an effective defense mechanism, and he will resist temptation, no matter how strong it may be. Such an individual, although the fear of infection may weigh his decision, will be of such intelligence that he will have had ample opportunity to have built up a defense mechanism against promiscuity on some more rational or altruistic basis.

Or, granting that he has sufficient intelligence to follow the devious windings of the hypothetical suppositions involved, he may decide in favor of promiscuity because of other, to him, equally valid and equally reasonable bases.

On the other hand, the mentally inferior person has not the intelligence to realize adequately the dangers involved. He cannot be approached on a really rational level where his emotions are concerned. And even though he may fear infection, his will-power and determination cannot be expected to be strong. He will either succumb to temptation or allow himself to be cajoled.

The proponents of chemical prophylaxis hold that ideals must never be lost sight of in meeting the issues of the venereal disease problem. But they argue that it is facts they are facing, not theories. Sexual promiscuity is as old as history and doubtless will continue to exist, no matter what the penalties or what our ideals may be. When the conditions of our civilization cause many men to postpone marriage several years beyond adolescence, there is a field prepared for promiscuity. So long as we have among us a class of women to whom prostitution is the easiest way, the demand will be met. Shall the proponents of chemical prophylaxis, like the little oriental monkey, cover their eyes and "see no evil"? Alas, they may not, for they are dealing with a very real foe.

During the World War the military medical officers preached continence to the soldiers, strove to imbue them with a fear of venereal disease infection, taught a sturdy idealism. But they did not dare trust to this method alone. They made it necessary, under penalty of court martial, for the exposed individual to take prophylactic treatment. The army's chief concern was to keep the men fit for military duty. Statistics show that thousands of cases of venereal disease were avoided by the method of enforced prophylaxis, while thousands of men became infected through neglect to take advantage

of this safeguard provided for them. All other arguments aside, there is no moral reason why the misconduct of any individual should be allowed to make him a menace to public health, as he will be if he contracts a venereal disease. The proponents of chemical prophylaxis have no quarrel with the teaching of sexual idealism. The two methods should be used conjointly, so that the value of both may be gained in dealing with various types of men.

It is realized that the control of venereal disease cannot be accomplished by medical measures alone. The need is seen for a complete program in which medical measures will be accompanied and supported by educational measures under the leadership of persons in close touch with health officials. This brings us to the question of sex instruction, which has also been a fruitful source of wordy arguments.

When should sex instruction be given, and by whom? It is the opinion of the present writer that it should be begun when the child becomes sex conscious, in a majority of instances at about the age of nine. Parents are the best teachers. The subject should be treated in a general way, using the biological history of plants and animals and leading up to the facts of human reproduction in a way that is not too literal or too personal. Parent-teacher associations are splendid organizations through which parents may acquaint themselves with the best methods of sex instruction. The appropriate material for teaching can be procured by the interested parent and the parent-teacher associations from the United States Public Health Service.

It is not well to defer sex instruction until after some vicious, distorted information has been imparted to the child through sources outside of the home. First impressions are the most lasting, here as elsewhere. The parent's task is not complete when he has placed the facts of sex before the child. It should be made easy for the child to acquire habits of cleanliness, for they do much to discourage the practice of self-abuse. As the child grows, his companionship, play, sports and books should be carefully supervised, preferably by making the good readily accessible, rather than by merely issuing edicts against the harmful. If this supervision is effectively carried out, the boy will grow up to have a high regard for his mother, sister, and women in general, and the girl will feel that she must behave

in a way to merit such regard. Sufficient labor to exercise the body and inculcate thrift and a sense of responsibility, along with the usual hardy sports of childhood, will be found of tremendous value in sublimating and directing the sexual urge into constructive and useful channels of expression.

At the age of puberty the boy and girl should be made acquainted with the facts of venereal disease. The ravages of syphilis and gonorrhœa should be made plain. This information should be coupled with instruction in regard to the normal sex functions. If parents are uncertain as to their information on the subject of venereal disease, they will find it easily obtainable from the family physician, or from some officer of the state or national health service.

The teaching of sex hygiene is not to be confined to the child and the youth alone, if we are to stop the ravages of venereal disease. Courses of mental and social hygiene should be a part of the curriculum of every high school, college and university and the public lecture courses of our social institutions, such as the Y M C A., the Y W O A., the Knights of Columbus, women's clubs and similar organizations. The white light of publicity must be turned on the hiding places of gonorrhœa and syphilis by telling and re-telling in plain, unvarnished words of the evils of venereal disease until the public conscience is once for all awakened. We must learn that in the matter of venereal disease, the concern of one is the concern of all.

A DISCUSSION OF THE PHYSICAL AND THE PSYCHIC BASIS FOR A NEUROPATHIC CONSTITUTION

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I IS THERE A PHYSICAL BASIS FOR THE NEUROPATHIC CONSTITUTION?

NUMEROUS articles have appeared discussing whether or not it is possible to deduce a relationship between physique and behavior with special reference to neuropathy. In other words, can we classify mankind by physique alone? In the past this was not found possible, but with improved anthropologic methods of inquiry the whole subject has again come to the fore. In the past the simple designations of physique and temperament or character were used extensively by physicians and scientists and were considered to be sufficiently definite to connote facts of importance in diagnosis and treatment, but a wide application of these physical types to neuropathy appears to fail. Nor does it seem possible that one may ever be able to classify human beings either in large or small groups for a basic diagnosis. Even attempts to formulate psychologic types independent of physique are faulty. In a more restricted application of the latter idea (James, Jung, Ostwald and others) there has been little advancement toward a solution of our problem. However, a critical analysis of all such data brings out diagnostic and prognostic values in clinical medicine that are important, though still confusing and inconclusive. With this latter end in view we may undertake (Section I) to make a critical inquiry whether or not there are sufficient data to correlate physique and neuropathy, (Section II) to discuss whether even a designation of psychopathic types and subtypes, as Jung has recently attempted, really advances us very far clinically, in our present research, and (Section III) we shall finally consider briefly what relationship may exist between predispositional types of temperament or character and the sequential mental disorders that are supposed to follow in their train.

Biologists have shown how the individual has attained a unity of organism. In their studies we find a summary of the preformistic

or hereditary view for individual behavior. They also have attempted to show how the inherited structural pattern, embracing the consolidated functions of a remote past, integrate and develop into a human organism as presented in a system of behavior reactions and vital modes of response. Further, they have tried to trace the functioning of the organism as a whole and to approximate the interrelations played by the organism and its specific environment, thus making a tentative dynamic or physiologic concept of human behavior. Their main contention is that organismic behavior is a system of protoplasmic behavior patterns in the process of adjustment to a given environment. Finally, they have attempted to reconcile the morphologic or static concept with the dynamic or physiologic view, into a broad, unitary system of normal and abnormal behavior.

We may turn our attention first to the present theoretical and hypothetical research that has been employed recently to gain a comprehensive understanding of character, make-up, disposition, dyscrasia, Anlage and personality itself, for sooner or later in studying all neuropsychiatric problems we must have a better knowledge of the underlying dyscrasia of the individual as a whole to disease, and to the specific psychosis in particular. Until comparatively recently, the more prevalent opinion was that the disease trend in the individual make-up held the causative factor in its own actual structure independent of its inherited physiologic aptitudes and capabilities, or that the exogenous agent had a specific reaction upon a static structural mechanism. Both these attitudes are more nearly allied in principle than one might at first think. For instance, those investigators who embraced the former view sought to show that the beginnings of the disease were really already pre-arranged in the genes or chromosomes and that, too, in some sort of pre-arranged structure of the organismic pattern, hence such investigators and even some eugenicists of to-day look to the actual heredity of disease entities in the ascendants instead of potentialities, aptitudes and other physiologic modes of behavior. On the other hand, the "specificists" in mental disorders looked to the whole mental phenomena of the clinical picture as incited by the specific or toxic agent exogenic or endogenic in character. In other words, neither the complicated inherited patterns in the conscious or unconscious life of the individual nor his own actual life experiences played any essential

rôle in shaping the disease picture. In brief, both positions have this in common. That they are really static in principle. In one the preformed structure carries the ominous significance in disease, and in the other the specific toxic or inciting agent holds the chief position in disease dramatization.

What is the obverse of these two not essentially opposed static viewpoints of mental disease? It rests first upon the biochemical view of life as a varying reaction, a vital mode of response of a given protoplasm acting and being reacted upon by a specific environment. The whole of several factors is taken into account, first, that structure is but the aggregation or physical summation of countless inherited vital modes of organismic response and that any conception of structure purely as such, independent of this physiologic view, fails to grasp the organismic pattern in its entirety. Again, it is freely admitted that in many instances these inherited patterns have power to select that part of the environment which best fits their needs. What is more, the reaction between these phylogenetic inheritors which lie in and compose the greater part of the summation of the protoplasmic structure and those apprehended from the immediate environment also have difficulties of correlative adaption which are often the beginnings of disease stress. Again, though the exogenic and endogenic agents of disease may have some selective power to work their specificity of reaction, there are always other factors which determine the course and outcome of the disease. Thus one apprehends at once why the causation and outcome of the disease process as a whole are such far-reaching and complicated problems. Hence the very great importance of a better understanding of the inherited patterns of response which are embraced in the individual imbalance of forces finally aggregated in a constitutional make-up. Any comprehensive exposition embraces at least four large provinces of observation and study. First, how is the general biologic inheritance crystallized in the structural pattern and shown in the physical and mental constitution? Second, what part does the interaction and compensation of structure and function play? Third, what shaping of the problem is purely physically or socially environmental, and last, what are the modifying influences to be attributed to specific accidents from without or within, such

as alcohol, syphilis and various toxic factors incidental to living? Inasmuch as no very exact or extensive data are at hand of equal value in any of these categories, our study must only be informing and tentative. Sufficient data are at hand, however, so that we may at least make some general observations.

It is perhaps most important to recognize that from a gradual developmental process we are now obliged to turn to the reverse of this process, namely, that of involutionary analysis and a retrospective synthesis. Much of the data which we shall critically review is hopelessly one-sided. For instance, what of the psyche in the endocrine and metabolic studies upon human beings? Any attempt at elucidation must try to pass that barrier of body to mind. Again, what of the physical status in Kretschmer's classification? The same may be asked of Jordan's, James', and Jung's attempts to classify human beings. Jung's data in particular are so largely drawn from undocumented personal experience and based for the most part upon the character attributes and behavior of great men, confessedly the most complex material to analyze, that many of his conclusions are of impaired worth. Such studies have an historic analogue in our now happily outworn histopathologic studies of mental disease from analysis of the brain solely, they have fallen so far short of our ultimate need in other respects that their precise use in interpreting disease processes is almost valueless. Fortunately in Jung's type-studies the compensatory aspects of the whole psyche are set forth for the first time. One regrets, however, that nearly all the material we have here as well as in other works is drawn from pathologic data. There are many drawbacks in attempts to reconstruct the norm for human society from its misfits. One can easily over-emphasize the importance of working in either direction from disease characters in the normal, and *vice versa*. The whole matter would be simpler if one were dealing with a static mechanism solely or even largely, which is confessedly what we are not doing. This is a conclusion that is daily becoming more painfully obvious and in many respects more despairing than ever.

Broadly speaking, the routes to these special studies have been along two not necessarily opposed lines of inquiry, namely, the physiologic and the psychologic. While the inherent foundation of

both is essentially biologic, for a time, even yet, they may seemingly be opposed and in order that there may be no misunderstanding we shall state frankly that the psychobiologic evolution of this character formation seems to us to furnish the clearer development of our subject.

At the outset we must recognize that the final integration of human character or behavior is very complex and many-sided, and our knowledge of any one aspect of the subject lacks definition and finality. Frankly, we are not yet in a position to postulate final and definite types of human beings in the aggregate of the so-called "normal." However, there are many who maintain that designating dyscrasic types as fundamental postulates for diseased individuals is as yet not only premature but the facts will ultimately foil any such even tentative conclusions. In view of the fact that we cannot even surmise the general pattern plan of character or human behavior, we are thrown back upon the main attempts to deduce as much of these types as possible from the studies of psychiatrists, psychologists and philosophers. Singularly enough physiologists or anatomists, who are the true anthropologists, have been little concerned in making out types or even constructing a single integration of character for man, so there is a wide structural and functional gap between our knowledge of lower organisms as contrasted with what we know of the behavior of man. This may be accounted for in part by the richness of man's physical and psychic make-up and his enormous plasticity in adjustment and adaptation to environment so that the task is too great to be encompassed.

In the recent writings of Marius, Bumke, Sommer, Bauer, Siemens, etc., one seeks in vain for any data on the relation of any plastic type, either to character on the one hand or neuropathy on the other. On the contrary, we find more or less skepticism expressed as to the existence of such a relationship. The attempt of Kretschmer is, so far as we know, the only effort of this kind, and he may be likened to Lombroso, who a generation ago sought to connect physique with character and psychopathy with more or less mischievous and disastrous consequences. Long before Lombroso's work, Gall and Lavater earned the title of pseudo-scientists for attempting the same thing.

It is easily possible to isolate physical inferiority of individuals, organ-systems and organs, whether structural or functional, and it is equally possible to isolate types of character defects and mental diseases. But when we seek to combine the two we never get anywhere. As one critic well expresses it, the modern researcher into the physical constitution is entirely indifferent as to the relationship between the soul and the body.

Of late many renewed attempts by metabolic studies have been evoked to explain cyclothymia and manic-depressive insanity, but so far as we know without any known chemical mechanism as a foundation. These affections seem to be psychopathy and psychosis of temperament only, in which character itself is not involved, as in hysteria and schizophrenia. There may therefore possibly be a simple biological basis of a biochemical nature. The sanguine or active man is, to begin with, of a more speedy metabolism than the opposed types, and the same factor that quickens the metabolism is seen in a higher state of activity in the hypomaniac, also naturally in an abnormally low state of activity in the melancholic phase. There is an entire group of periodic psychoses or psychoses with an ebb and flow which may possibly arise on the same basis (Ewald).

A hypothesis of labile and surging metabolism may possibly explain a single temperament and a certain group of psychoses just as the periodical disturbance of the alkaline reserve of the blood explains recurrent convulsions, but this conclusion strips us of all resources to explain the cautious, serious, reflective temperament on the one hand and the schizophrenic group of psychoses on the other. Various studies on the metabolism, blood-pictures, etc., of dementia præcox are admittedly negative even by those who would be pleased to locate them (Wirth). The schizophrenic shows much more evidence of physical inferiority of the various kinds than the cycloid. Bleuler, in fact, has long used the term "syntonic" as descriptive of the normal man and as antagonistic to the schizoid. But for him these two terms connote characters and not temperaments. Despite the fact that the syntonic seems at first sight to conform to Kretschmer's cycloid, this is not the case, for the former stands for a character and the latter for a temperament. Or rather cycloid stands for both the sanguine and active temperament and syntonic for character.

By exclusion the only physical factor to explain the schizoid character is found in the endocrinous system, not in the extreme forms of the dysplastics but in the more sublimated general types. There are many disharmonies in the ranks of the schizophrenics and of these many can be traced to the endocrines. There is also a body of facts concerning the Abderhalden reaction in the same groups which is also a suggestion of the endocrine origin. It is, of course, possible for the endocrines to be the seat of quite different disturbances. In one these may be only qualitative, consisting of an excess or deficit of certain hormones. In another the alterations may be structural and much more profound. Thus structural anomalies are claimed in the gonads of some schizophrenics and especially in a high degree in homosexuals.

One reason for obscurity is that we are inclined to look upon good development of body as evidence of normal mentality. Nothing is more fallacious. Excess of physical development may co-exist with physical degeneracy. We see this in the progeny of syphilitics who may show members who are subgiants and appear to be physically very superior (Craig, the authority on the Wassermann, makes this statement). Good skeleto-muscular development may merely indicate some insignificant lesion or functional irritation of the pituitary body.

Bumke seems inclined to think that Morel introduced a false notion of degeneration into psychology. In his day even goitre and cretinism were looked upon as due to endogenous deterioration. As for the physical stigmata of degeneracy so-called, Stieds, the anatomist, has expressed the opinion that most of these are normal anatomic variations. In no way can they indicate the existence of a vitiated psyche. Lapouge and Nicefero seem to have shown that these stigmata occur in the greatest number in the underfed and that they have nothing to do with heredity or degeneracy. Bumke implies that the study of these subjects is still in its infancy. In re-creating the subject-matter we should single out a known cause of hereditary deterioration such as syphilis, as far as possible excluding other factors. It is certain that in the progeny of syphilitics we shall find much which comes under the conventional head of degeneracy. Gross malformations, for example, are notably common, as in

infantile poliomyelitis Fournier in a study of forty-five families found sixty-one children with malformations The progeny in uncomplicated alcoholism should then be studied, while a third type is that due to lead

However, so-called "racial protoplasmic poisons" are not indispensable for the production of malformations The experience of the Polish ghetto Jews illustrates that mere underfeeding and absence of air, light and exercise are quite sufficient to produce all of the evidences of physical and mental degeneracy It is true that the Jew has a racial predisposition to nervous affections which is attributed in part to centuries of chronic fear states and repression of natural desires as well as psychic and physical inbreeding But there is no reason to suppose that any other racial strain would not be similarly affected under the same conditions There should be plenty of opportunity to study in other peoples the general effects of malnutrition, especially after the war when so much of the world is chronically underfed This has been done from the angle of the vitamin problem but not to any great extent on the effects upon the offspring of the underfed from the angle of the physique

Another possible factor in producing so-called "degeneracy" is intermingling of race The union of a culturally superior strain with inferior ones must necessarily lower the standard This subject of course leads directly to eugenics and it is easy to see that various physical and psychic handicaps have come about through crossed heredity

There is, however, every reason to believe that if all of these causal elements could be eliminated in connection with heredity, psychoses and neuropathy would still develop in the resulting sound stock. Instead of being simplified the problem would then become more recondite than before Half a dozen hypotheses would at once suggest themselves, such as a natural tendency for strains to grow old and defective before dying out, sports, mutants and physiological variations, outcroppings of mendelian recessive qualities, unknown factors acting on the child *in utero*, etc

It has sometimes been pointed out that, while very much is said of the factors which make for degeneracy, we hear little of the other side—the integrating factors which make for superiority First

we have the element of regeneration which seems to show an effort of spontaneous character to atone for defects. We know, for example, that wounds try to heal, that anti-bodies form, and we infer that this conservative principle is always exerted when the individual or race is menaced. There is also the principle of adaptation to the environment in virtue of which defects in the make-up tend to adjust themselves with the growth and experience of the individual. Again, there is the principle of compensation through which a defect may be made good by a superiority in some other function. All the elements are aspects of the defense of the organism against destructive forces. Through their operation a defect instead of dragging the individual down is very often in the long run an asset.

Over and above this viewpoint we know that the unconscious part of man is still imperfectly understood and contains the germ of infinite possibilities. When we speak of an individual as a physical, psychic, or moral degenerate, we overlook the phenomenon which we call genius, which is very apt to be associated with these inferiorities. It is probable that very little genius comes to self-expression, and while it is often compensatory during the life of the individual it seldom receives full recognition until long after death.

The recently published work of Bean tends to exclude the idea of race as a necessary factor in build. He points out that in all cultured nations there are large and well-developed men alongside of poorly developed members. This is as true of the Chinese and Japanese as of the English. Superior advantages of all kinds make for greater stature, lighter color, better nutrition. If this teaching is upheld it will do away largely with legends of immigrants of superior blood into primitive communities. Exotic blood will not be needed as a hypothesis to explain why the ruling caste is taller and more fair than the aborigines.

As far as the white man is concerned Bean makes but two basic forms, the hypermorph and the mesomorph. Of these the latter is the type, the former the deviant. The hypermorph is characterized by a relatively small torso and long limbs and he may be short or tall—it is not a matter of stature as much as proportion. The tall hypermorph is the North Aryan or Nordic—although as already stated race is only an incident, the short hypermorph is the Mediterranean man. The mesomorph has a relatively long trunk and relatively short

extremities One of the most basic distinctions between the two is the habitat, for the hypermorph is a marine dweller within easy access of the ocean while the mesomorph is a resident of the hinterland Bean asks in passing whether the relatively long limbs of the hypermorph could be brought into association with the increased iodine content in the food of the marine dweller The two types differ notably in character or outlook on life, although this difference is not brought into direct causal relationship with the build The hypermorph, living close to the ocean, is venturesome, speculative, a traveler and a gambler in life, while the mesomorph is a home body who plays safe The hypomorph is found in the dwarfish members of the darker races, and, as stated, is not represented among the white races.

The plastic types of Kretschmer are built up without introducing any question of race His athletics, asthenics and blends of the two correspond to Bean's hypermorphs, while the mesomorph is Kretschmer's pyknic, the compact or harmoniously proportioned man While Kretschmer goes far more extensively into the mentality of his basic types, the views of Bean can be harmonized with them

Let us now take up various mental or behavioristic habits or bents and compare them with the anatomical conformations In passing we may allude to the relation between physique and susceptibility or resistance to disease in general This subject has large literature and is being energetically pursued—in New York, for example, by Draper and others The asthenic habitus as a physical plastic type is known to be associated with lowered resistance to tuberculosis, while it is also active in the production of enteroptosis and intestinal auto-intoxication The superior health and vigor of many cancer subjects before the disease makes its appearance has often been commented on and cancer and psoriasis have been termed "diseases of the healthy" There is a belief that the red-headed have a lessened resistance to infectious diseases, while the prognosis is less favorable than in the average man.

The chief obstacle to a common belief in the existence and significance of stigmata of degeneration is the fact that they are present only in a minority of neuropathic subjects, while they may be found with almost the same frequency in the mentally and physically sound Typical stigmata consist largely of asymmetries, chiefly

craniofacial, while atypical ones are endless in number and variety. The significance of stigmata is seen in heredity, in the progeny of syphilitics and alcoholics there are seen side by side with still-births and short life cases of mental defect, cerebral palsies, gross malformation, etc. Much of our belief in the association of mental with physical defects comes from the family trees published from time to time—those of Fournier, Lundborg and others—which are probably by no means representative but such as readily occur in special strains like those in the Jukes pedigree. In like manner too hasty generalization made it appear that the offspring of consanguineous marriages abound in psychophysical defects, which claim has long been made. The subject of temperament is one of the most difficult to associate with physical types, largely because temperament is so difficult to define. Thus, it may be confused with temper or disposition and with character. Further confusion arises because of the difference in ancient and modern views.

The term "temperament" was reintroduced about the time that phrenology and physiognomy had their greatest vogue in the sense of organ-system superiority. While empirical and perhaps pseudo-scientific the views admit of harmonizing with later teachings as already stated. Superior development or activity of the muscular system was known as the motive temperament, of the nervous system as the nervous temperament and of the visceral system as the vital temperament, probably because the lungs and heart were held to possess superiority along with the other viscera. These three temperaments conform quite acceptably with Kretschmer's plastic types for the motive temperament agrees with his athletic, the vital or visceral with his pyknic and the nervous with his hybrid athletic-asthenic. As for his pure asthenics they represent a general organ inferiority.

It might be possible to isolate types based on organ-system inferiorities, negative types, possibly several subtypes. The short-intestine, constitutionally lean types of Goldthwaite would represent a partial subtype in which brevity of the intestinal tube is responsible for restricted assimilation. Atony of the tube with atonic dyspepsia and constipation, stasis and auto-intoxication suggest another. Organ inferiority of the nervous system is shown in many ways, and more than one type might be isolated, as suggested in mental

defectives who are either irritable or apathetic. As for an inferior motive type we can hardly dissociate the muscles from the skeleton, so that the asthenic type may be thought of in this connection. The long and narrow chest not only cramps the thoracic viscera but also favors visceroptosis and its complications. In the discussion of degeneracy and somatic stigmata the homosexuals may be mentioned on account of the common habit of classing inverts as degenerates. Hirschfeld opposes this term and as a result of examination of over a thousand inverts found them remarkably free from stigmata of degeneracy. The psychic stigmata are naturally largely those of sex confusion—characteristic speech, gait, etc., are present in many cases. Much has been written of the character of the higher homosexuals, but to what extent this is endogenous and how much it is reactionary or defensive are unsettled. The conception of homosexuality as held by Hirschfeld is a very broad one and includes apparently all men who systematically avoid the society of women and lead a strict celibate existence. In many the homosexuality is so sublimated as to be inconspicuous and the suggestion of sex confusion may be limited to a fondness for cats, parrots, etc. Men of this type form close friendships among themselves but without any suggestion of scandal. With such a broad definition of homosexuality one could hardly expect to see anything like physical or psychological uniformity which, as already stated, is limited to special groups.

Much has been written of the mental peculiarities of the undersized man as shown especially in the remarkable careers attached to many names in the world's history. It is generally conceded that the ambition, energy and other positive qualities which they exhibit are secondary—compensatory or defensive—rather than primary. This may not be altogether true, for the mere fact of a small body may be an advantage. The nervous system in such subjects is fully developed even if the skeletal and visceral organs are undersized. Small men are often enough possessed of great activity and agility. However, they are usually not taken seriously by large men and often are treated with a contempt which is more or less unconscious. It is this attitude on the part of a larger man which arouses the ambition of the smaller individual. The little woman is under no such provocation and we do not see her develop like the small man.

It was at the Revolutionary period especially that many under-

sized men sprang into prominence—Napoleon, Wellington, Nelson, Hamilton, Burr, and Paul Jones are a few of the names which at once suggest themselves. None of these men was dwarfish and none may have merited the designation of small when strictly construed. There is little reason to believe that any of them felt inferior on account of his stature, which was not very far below the average. One is almost forced to conclude that some natural mental superiority is associated with slight inferiority in size. The inferiority sense of Napoleon, if he had any, seems to have been bound up in his poverty, lack of friends and in his foreign origin and poor French. Small and slender men have not infrequently shown the presence of great energy and endurance.

Akin to small stature is some physical malformation or functional anomaly, although the reaction is different, for small stature cannot be directly remedied, while in physical or functional defects this may be possible. Demosthenes was not merely an example of genius combined with malformation or organ inferiority, but he overcame his speech defect because this furnished motive. Recently an article which appeared on the speech defects of actors and other professionals showed that this relationship was not uncommon.

Akin to these defects of structure and function is the state of invalidism. So many hopeless valetudinarians have done excellent work in various fields that we are not surprised to hear the remark that "most of the world's work is done by invalids." Prolonged illness and confinement in bed has made many a thoughtless man thoughtful, has in the speech of the day changed an extrovert to an introvert. In addition the subject sees his career as originally planned nullified, feels perhaps that he has not many years of life ahead and thus is influenced to some sort of an intensive life which harmonizes best with his invalidism.

These speculations take us a long way from the subject of a necessary correlation between anatomical structure and behaviors, but the truth is that it is impossible to say that the behavior comes purely from the structure and it is more reasonable to believe that the correlation comes about indirectly. How, for example, could the elongated limbs of the hypermorph affect his mentality? Is it not more logical to infer that the two may come from a common source

or that the mental characteristics are largely the product of geographical environment?

Space will not suffice for further discussion and in closing we may sum up what is known or surmised of the nature of the physical basis of the neuropathic predisposition or lowered resistance to neuropsychic disease. First, we may compare this with the plastic conformation. America was the original home of the neurasthenic and abounds in men of the nervous temperament. The physical type of the American as compared with that of his European progenitors is slender. European emigrants seem to have been impressed by the great portion of slim men in the New World and the Irish emigrant even went so far as to apply the term "Narrow back" as a racial designation, especially if he was called an opprobrious name first. The build of the American, then, is mostly typically hypermorphic, with relatively small trunk and elongated extremities, although Bean gives many photographs of American mesomorphs of the old stock. According to Beard the typical neurasthenic was slender, and the same build seems to have supplied both nervous activity and nervous insufficiency. As already pointed out, there may be a question concerning the normalcy of the man of nervous temperament. Often he impresses one as being a sufferer from his disposition, who is irritable and out of sorts and gets little enjoyment out of life. He shows many schizoid traits, such as discontent with conditions as they are and an urge to uplift and reform others.

It does not follow, of course, that the anlage for neurasthenia is the same as that for psychoneuroses, psychoses, etc. If Kretschmer is right the two main forms of endogenous insanity originate in opposite types of people. Manic-depressive insanity usually develops in the pyknic, in the man of cycloid temperament and is an exaggeration of his cycloidism. It is self-limited although tending to recur and is not followed by dementia nor does it become chronic.

Dementia præcox, the other common type of endogenous insanity, originates by preference in the schizoid who is of the athletic, asthenic or blended build, and, if Kretschmer is right, should be very common among the hypermorphic Americans. However, there does not appear to be any lack of manic-depressive insanity in this country and this may be due in part to the large amount of insanity in European emigrants and their progeny. As far as we know, no American

alienist has as yet sought to verify or disprove Kretschmer's views for his asylum material and the great amount of anthropometry necessary for such a task will probably prove a deterrent

The evidence of Kretschmer among other documents appears to show that there is no structural type which is common to all neuropsychics but on the contrary that different builds are associated with different types of neuropathy. Evidently there is little use in a search for a common neuropathic type, but it should well repay the effort to trace a connection between special physical and mental types and special types of neuropathy and psychopathy.

Slowly but surely it is beginning to dawn upon us that all purely objective attempts to classify mankind are not only futile but perhaps unnecessary. What is really desired is a knowledge of traits and aptitudes so far as they can be predetermined, not in the confusing terms of enormously elaborated performed patterns of functions, but in a clearer understanding that such functions as behavior may be only a little less intricate in their formation. It is hardly less stupid for us to relate the conscious elaboration of an objective formation of character and not take into account the subjective development of the instincts and their utilization in the living process than that which we have indicated as a purely static and structural conception of personality that has been outlined by Kretschmer and others.¹

¹ Sections II and III will appear in subsequent issues of the INTERNATIONAL CLINICS

COMMON DIGESTIVE SYNDROMES ENCOUNTERED IN CARDIOVASCULAR DISEASE

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A VERY large percentage of the patients presenting themselves to the internist complain of digestive disturbances. It is striking, however, that most cases of digestive disorder do not show the presence of organic pathology in the alimentary tract itself when studied by the usual diagnostic, laboratory, and roentgen methods. Cardiac disease as a possible origin for abdominal symptomatology has been recently brought to the foreground by the realization that an acute abdomen may be simulated by coronary thrombosis, but the other types of cardiovascular disease as responsible for digestive disturbances of a less acute nature have been largely overlooked. It is the purpose of this paper to set forth some common relatively chronic digestive syndromes which may be produced by disease in the circulatory system.

CASE I is interesting because of its presentation of many features of carcinoma of the stomach. A woman, aged sixty three, American, married, first seen in November, 1924, presented a history and clinical picture suggestive of carcinoma of the stomach. Her family and past histories were not significant. The onset of her present illness occurred about one year before her first visit, when nausea, heart-burn, and a "burning sensation over the stomach" were features. The course of the illness was characterized by an increase in these symptoms and progressive loss of weight, weakness, increasing pallor, an occasionally associated precordial pain, and substernal tightness. Her digestive symptoms were occasionally relieved by alkalis and lying in the recumbent position. On physical examination she presented as prominent features, evidences of much recent loss of weight, marked pallor, a firm gland palpable above the left clavicle, a slightly enlarged heart, thickened and tortuous radials (with blood pressure of 130/75), marked tortuosity of the retinal vessels, and a completely negative abdomen. Because of her history and physical examination, a provisional diagnosis of carcinoma of the stomach, arteriosclerosis and angina pectoris was made.

Special studies were then pursued to confirm the diagnosis of carcinoma of the stomach. X ray studies were entirely negative. Gastric analysis showed achylia gastrica without any occult blood. A biopsy on the supraclavicular

gland failed to show the presence of any neoplastic metastasis. Nitrites were given with marked relief of symptoms during this diagnostic period.

Shortly after the excision of the gland for pathological study, the patient contracted a then epidemic upper respiratory tract infection. Coincident with this infection came an intensification of digestive symptoms, relieved by nitrites, and myocardial insufficiency, as evidenced by tachycardia, rales at the bases, orthopnea, and tenderness in upper right quadrant (with a slightly palpable liver). The patient was given her physiological dose of digitalis in forty eight hours, followed by small doses of digitalis, as maintenance doses thereafter. She was completely relieved of her symptoms.

She returned to the care of her family practitioner in a small town in New Hampshire in February, 1925, and has been under constant digitalis therapy since. She has been doing her own housework and living a fairly normal existence. Occasional attacks of substernal tightness and precordial pain are relieved by nitrites. In May, 1926, she is reported "doing as well as can be expected," without prominent digestive disturbance.

CASE II is that of a patient who presented many characteristics of chronic appendicitis. An American, married, aged sixty three, merchant, was first seen in April, 1925, with a specific request to ascertain whether an appendix lesion existed, which necessitated operation. His family history was interesting in view of cardiorenal disease in his father and one sister. His past history was noteworthy because of the following: Much oral sepsis, dyspnea and palpitation on moderate exertion, and nocturia for past six months, questionable rheumatic fever twenty five years ago, and loss of fifteen pounds in weight in the past year. The onset of his present illness occurred three years before his first visit and was characterized by intense general abdominal pain without radiation to back or shoulders, lasting from twelve to twenty four hours, usually occurring in the early morning and occasionally somewhat relieved by food. These attacks occurred as frequently as every three months and were tolerated only by the administration of morphine. In the five months preceding this first visit, they had come as often as three times a week, of increasing severity, and accompanied by a "suffocating feeling," orthopnea, substernal tightness, and palpitation. His mental state was quite disturbed because of the apparent necessity of operation on the one hand and a fear of cerebral insult, which he felt was "in the family."

On physical examination the prominent features were evidences of recent loss of weight, tortuous retinal vessels, many devitalized teeth with pyorrhea, exceedingly tortuous brachial vessels, heart and lungs negative, tenderness on deep pressure over right iliac fossa, and blood pressure of 140/88. The history of generalized abdominal pain with local tenderness in the right lower quadrant together with a previous X ray diagnosis of chronic appendicitis, made this diagnosis a definite possibility, though the recent cardiac symptoms and evidences of marked arteriosclerosis suggested a possible cardiovascular basis, either an abdominal manifestation of angina pectoris or an intraabdominal vascular crisis, on the basis of sclerosed abdominal vessels. Fluoroscopy of the chest at this time showed lung fields and mediastinum clear, heart of ordinary size without arrhythmia, a wide aortic knob, normally descending diaphragms, and opposite the third rib on the right a shadow which looked like a calcified tubercle (on roentgenograms by Dr. P. F. Butler this was evidently a calcified tubercle without evidence of tuberculosis elsewhere in the lung fields).

Gastro intestinal series showed a negative œsophagus, stomach, and duodenum. At six hours no gastric residue was seen, the cœcum was filled regularly and was freely movable. At the twenty-four and forty-eight hour examinations, the appendix was angulated but filled regularly and was not tender on palpation. The colon was entirely negative on ingested meal and enema.

Laboratory studies showed the following interesting points. Trace of albumin with hyaline casts in urine, blood sugar and non protein nitrogen within normal limits, slight secondary anemia with normal blood count, negative blood Wassermann reaction, and stools negative for blood, ova, and parasites.

During the course of these studies, the patient was advised to take nitrites for any attacks of pain. He obtained almost instantaneous relief by allowing nitroglycerine gr 1/100 to dissolve on the tongue. A letter written to the patient's family physician in Providence at the conclusion of these studies contained the following summary: "I have never seen Mr P. in an acute attack of the type he complains of. It is therefore impossible to do anything else than go on his history. It does not appear to be typical of appendicitis, gall bladder or urinary tract disease. I feel that in view of definite evidences of arteriosclerosis (peripheral vessels and retinæ), the recent evidences of cardiac failure (dyspnea and palpitation on exertion and precordial pain) and the apparent relief by nitrites, the condition is probably due to arterial spasm."

Treatment was directed towards the relief of arterial spasm, whether it occurred in the coronary or mesenteric vessels. Nitrites were given at the onset of pain. Atropine was given in small doses to relax the intestinal musculature. A low roughage diet was prescribed. The immediate effects of this treatment were so satisfactory that for the time being gall bladder studies were deferred.

The patient was not seen again until November 20, 1926, when he reported "I feel ever so much better." He had only one attack in five months and this was after an automobile accident. He has had, however, some spells of an "all gone feeling in my stomach," and some increase in dyspnea on exertion. An electrocardiogram done at this time showed no abnormality. Gall bladder studies after the oral administration of tetraiodophenolphthalein showed a normally filling and emptying gall bladder. He was put on moderate doses of digitalis with marked relief from his "all gone" feelings and dyspnea.

When seen on July 12, 1926, he had gained weight and had been absolutely symptomless while continuing on digitalis. The necessity of adequate rest to this high spirited man was emphasized again.

CASE III is of interest because of the presence of symptoms of peptic ulcer. A college professor, French, aged fifty six, was first seen on October 17, 1925, because of stomach trouble which he said had been diagnosed "ulcer." His family history was interesting because of much cardiac disease (father, mother, two uncles and brothers) and syphilis in his paternal grandparents. His past history showed much dental caries, gonorrhœa at twenty, nocturia (once a night), overeating, and the use of much tobacco and alcohol. He had had, since eighteen, recurrent attacks of pain in the epigastrium every summer, which were relieved by opiates. The onset of his present illness occurred three years previous to his first visit, when pain localized to an area about two inches in diameter in the left hypochondrium with a sensation of gas pushing on the heart two to three hours after meals became a feature. He had never had nausea, vomiting, jaundice, hemate

mesis or melæna The attacks of pain have been especially severe at night, arousing him from sleep This pain was relieved by food and gaseous eructations On physical examination the prominent features were moderate dental caries, small scarred tonsils, slightly tortuous retinal vessels, thickened radial vessels, a generally enlarged heart totally irregular in rhythm, *pulsus irregularis perpetuus*, marked pulse deficit, cutaneous and deep pressure tenderness in left hypochondrium about two inches in diameter, no râles at lung bases, liver not palpable, œdema of the extremities It was felt that all of this patient's complaints were explicable on the basis of myocarditis (arteriosclerotic) and auricular fibrillation, because of the definiteness of localization of the pain and tenderness on palpation, it was thought best to rule out a lesion of the stomach

Fluoroscopy showed a concentrically enlarged irregularly beating heart. The lung fields were entirely clear The movement of the diaphragms was restricted on both sides, in accordance with the marked emphysema. The anterior and posterior mediastina were clear Gastrointestinal series were negative throughout. Tetraiodophenolphthalein gall bladder plates after the oral administration showed a normally filling and emptying gall bladder

Laboratory examinations showed the following points Trace of albumin in urine with occasional hyaline cast, blood non protein nitrogen within normal limits, blood Wassermann reaction negative, gastric analysis normal fractional curve, and stools negative for blood, ova and parasites Electrocardiogram done at the Deaconess Hospital reported diagnosis of auricular fibrillation

The patient was unable to undertake bed rest because of pressing academic duties He was given ordinary hygienic instructions for an ambulatory cardiac and 15 minims of a standardized tincture of digitalis three times daily On returning in a week, his pain and abdominal discomfort had completely disappeared, and he reported considerable improvement in his general condition He has continued on digitalis without any recurrence of symptoms and when last seen on June 8, 1926, before sailing for France, he was practically symptom free

DISCUSSION

The cases described above all presented prominent features of common digestive syndromes The first two might easily have been subjected to operation, the last one, with a definite arrhythmia, would probably have been spared because of this obvious cardiac malfunction The immediate results of surgery in any of these cases would probably have been disastrous The necessity of careful study of the cardiovascular system in all patients beyond middle life, who present abdominal symptoms, cannot be over-emphasized

Whether or not a causal relationship be postulated between cardiovascular disease and digestive symptoms, those cases presenting the relatively late effects of cardiac insufficiency such as orthopnoea, cyanosis and œdema would not be frequent objects of diagnostic error But it is rather the early sclerotic variety without such frank evi-

dences of insufficiency that presents intricate problems involving other systems than the cardiovascular. Here increasing dyspnoea, response to exercise and emotion by substernal tightness and precordial pain, and relief temporarily by nitrites and more permanently by digitalis, are probably the most valuable points in diagnosis. Yet it is conceivable that nitrites may relax smooth muscle-spasm sufficiently to release the picture of spasm superimposed upon disease intrinsic in the digestive system and thus not assist in the differentiation from disease of extradigestive origin.

The possibility that a surgical condition of the abdomen exists concomitantly with cardiovascular disease must not be ignored. The course of treatment in such a case must be carefully considered, for often the removal of a pathological gall-bladder, with its necessarily recurring insults to the heart in the attacks of gall-bladder colic, may favorably alter the patient's prognosis as regards coronary involvement. We have recently seen such a case, in which, after the removal of the distinctly pathological gall-bladder, much less severe anginal attacks occurred. If the patient's general condition warrant the risk of operation, in the event of a definite diagnosis of abdominal pathology and symptoms which are sufficiently severe to undermine the general health of the patient, surgery is certainly indicated.

SUMMARY

(1) Cardiovascular disease, especially of the arteriosclerotic type, may present a picture of an acute abdomen, as in coronary thrombosis, or of common relatively chronic digestive syndromes such as carcinoma of the stomach, appendicitis, peptic ulcer and cholecystitis.

(2) Patients, particularly beyond middle life, presenting digestive symptoms should be carefully considered from the cardiovascular standpoint. Generalized or localized arteriosclerosis, increasing dyspnoea, substernal tightness, and precordial pain on exercise should all be noted. Response to rest, digitalis, and nitrites may be used as therapeutic tests.

(3) The finding of cardiovascular disease should not be a constant contra-indication for surgical interference in the presence of definite abdominal pathology. The ability of the patient to stand the operation in addition to the magnitude of the symptoms arising from the abdominal lesion should be the determinants for further therapy.

THE MEDICAL TREATMENT OF UNCOMPLICATED GASTRIC ULCER

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THE question of effective treatments of gastric ulcer seems to me one of the most difficult to solve. A non-indurated ulcer is an affection whose characteristic is to evolve in serial attacks, each lasting about three weeks, separated by intervals of quiet, lasting anywhere from a number of weeks to several years. On the other hand, if an ulcer has given rise to hemorrhage the patient may, after this event, be quite free from any suffering for quite a long time. Any treatment, provided that it is resorted to at the end of an acute attack or, as is frequently the case, after a hemorrhage, may appear to be efficacious. Therefore, it is only by numerous experiments that conclusions may be arrived at and especially the disappearance of radiographic images coinciding with persistent clinical amelioration.

There are several ends to be attained in the treatment of the lesion under consideration, the first being *the control of spasm*. Pyloric spasm usually occurs *no matter where the ulcer may be seated*. During the acute episodes, they are above all pyloric, and the disturbance of gastric mobility, far more than a change of chemism, governs the progress and symptomatology of the process.

Secondly, the lesion must be treated, as far as possible, by powders which are supposed to adhere to the surface of the ulcer, thus acting as a dressing.

Thirdly, a diet must be prescribed in order to avoid any food that might have effects contrary to the two preceding therapeutic indications.

(1) *Anti-spasmodic Treatment*—The best drug we have is belladonna, from six to thirty drops of the tincture in water, one-half hour before the two principal meals. Begin with six drops and increase the dose by one drop at each meal until fifteen are taken and after this dose is reached the drug is increased by one drop a day. It should be stopped before reaching the maximum dose if the pain

is relieved by a smaller dose and the required dose is then continued, but should pain recur, the dose is to be increased by drops as above stated. This treatment is not to be stopped when the pain ceases and never suddenly, the stability of the improvement must be tested by progressive decrease of the drug. This may be called the major prescription in the treatment of ulcer.

If the patient does not tolerate belladonna it can be given in lesser quantity by combining it with other active drugs, such as a mixture of equal parts of the tinctures of belladonna and hyoscyamus, or

R
Tinct. belladon, 10 cc
Tinct. hyoscyam
Tinct. cannabis ind
Fld ergotin aa, 5 cc

This is given at the same dose as the tincture of belladonna above recommended.

Belladonna may be replaced by atropine as follows

R
Atropin sulph, 2 centigrams
Glycerini at 25° B, 3 cc
Ag. dest., 1 cc, 5
Alcohol at 95°, 10 cc

Fifty drops of this formula contain two milligrams of atropine. Dose, three drops progressively increased until twenty-five are reached.

In case of very severe attacks of pain, atropine sulphate is useful as its action is frequently very prompt, but the drug cannot be continued for any length of time, it must be given hypodermically in progressive and then degressive doses. On the first day a quarter of a milligram is injected, on the second day one-half milligram, increasing the dose one-quarter milligram daily until two milligrams are injected and then the dose is progressively decreased one-quarter of a milligram daily. When the daily dose of one milligram is reached it is better to divide it into two injections, one in the morning and one in the evening.

As anti-spasmodics and for controlling pain, I look upon belladonna and olive oil—regardless of its contrary experimental action (Pawlov)—as most excellent. *Very pure* olive oil, in subjects who

can tolerate it, exercises a soothing action in calming pain and spasm. A soup-spoonful is to be given on an empty stomach and another one-half hour after meals and another at 10 A M and again at 4 P M, if required. It may be given in emulsion or beaten up in milk. I shall attempt to show its valuable therapeutic properties when combined with other drugs, especially belladonna or bismuth.

Of late other anti-spasmodics have been recommended. *Papaverine hydrochlorate* is only mildly toxic, begin with three centigrams daily and progressively reach ten centigrams. *Hemlock* has been revived by Richaud, who has shown that from one to five centigrams, reaching even ten to fifteen centigrams in twenty-four hours, may be given without danger. A solution of hydrobromate of cicutine, 15 per 1000 (1 c c = 0.015) for hypodermic use, or the alkaloid may be given by mouth.

R

Cicutin hydrobromat, 10 centigrams

Syr cort aurant., 150 grams

A soup-spoonful contains one centigram of the drug.

A 20 per cent. solution of *benzyle benzoate* is sometimes prescribed in drops, from \overline{xx} to \overline{xxx} being given before each meal, but in order to obtain results, one must give one-quarter, or even half a teaspoonful in a little water one-half hour before meals. The drug is also a hypotensor.

Sodium borate is employed in the form of biborate or tetraborate in a 5 per cent. solution, at the dose of two or three soup-spoonfuls a day (Loeper and Turpin). It is to be given for eight to ten days and then stopped for a few days so that the patient may not become accustomed to its action.

The choice of these various drugs is determined by the pathologic phase of the ulcer. At the onset of an attack, injections of atropine usually give quick results. Then, when the acuteness of the pain diminishes, tinct. belladonnæ may be used. It is to be exhibited during the intercalary periods, and in my opinion constitutes the *fundamental medical treatment of gastric ulcer*.

The other anti-spasmodics are serviceable for varying the treatment. In the phase of late pain, certain prescriptions are effective, fractional doses of some alkaline-sulphated mineral water may be useful for regulating gastric contractions and opening the pylorus.

The following powders may be given in half a glass of hot water, to be drunk slowly

R

Sodii sulphat., 1 50 grams

Sodii bicarb., 2 0 grams

Sodii phosphat., 2 50 grams

In less marked cases one need simply order several tablets of carbonate of calcium or hydrate of magnesia to be slowly dissolved in the mouth. With these local sedative treatments one must combine a general sedative treatment, such as tepid baths, morning and night, but not followed by rubbing.

(2) *Gastric Dressings*—No matter what may be the mechanism by which inert powders act, the clinical fact remains that gastric dressings (coatings) have a distinct action on the ulcer, its evolution and pain. They have been known for centuries and kaolin was used years ago. Bismuth is the most active and most popular of these, the carbonate or subnitrate being the best. These are prescribed in various ways, but, to me, the simplest and most effective are the two following prescriptions which have the advantage of combining olive oil. They have given me great satisfaction.

R

Bismuth carbonat., 10 grams

White electuary (French Codex), 200 c.c.

This electuary is composed as follows. Powdered sweet almonds, 30 grams, powdered bitter almonds, 2 grams, white sugar, 30 grams, gum tragacanth, 50 centigrams, orange flower water, 10 c.c., distilled water, 120 c.c.

The following formula realizes, in the form of a stable emulsion with a pleasant taste, a combination of oil, mucilage, belladonna and bismuth.

R

Ol. oliv., 150 c.c.

Syr. sacchar., 40 c.c.

Syr. belladonnæ, 25 c.c.

Bismuth carbonat., 15 grams

Aq. flor. aurant., 40 c.c.

Ess. amygdal. amar., gtt. v

Decoct. carrageen., 100 c.c.

This preparation contains 33 per cent. of its weight in oil, a soup-spoonful contains gtt. v tinct. belladonnæ and about one gram

of bismuth The amount of bismuth may be increased without interfering with its stability On the other hand, by decreasing the syrup of sugar a proportional quantity of belladonna syrup may be added

These prescriptions are given at the dose of five to six spoonfuls a day, one or two the first thing upon rising, one fifteen minutes before each meal and another one to three hours after each meal (before the time of occurrence of the *late* pain) They are quite as effective as large doses of bismuth (20 to 30 grams)

Ramond's gelose-gelatine dressing may also be used Besides carbonate and subnitrate of bismuth, the subgallate and salicylate of bismuth may be prescribed as their adhesive properties are considerable, while the addition of manganese peroxide increases their action Bismuth may be replaced from time to time, or combined with inert, non-toxic powders such as *talcum* or *kaolin*.

Anti-acid medication is of old date Sodium bicarbonate is the most employed and the most injurious It secondarily stimulates the mucosa after exercising a temporary sedative action, it should never be prescribed alone and if its anæsthetic properties are desired it should be prescribed in small doses combined with other drugs

Soupault was the first to show the advantages of small doses of saturating medicaments repeated frequently These are exhibited every hour to begin with, later every two or two and a half hours, then every three hours One of these powders is composed as follows

R

Sodii bicarb

Cretæ preparat. ℞℞, 50 centigrams

Magnes calcinat.

Bismuth. subuit. ℞℞, 25 centigrams

Debove used a similar powder to which he added five milligrams of codeine during the very painful episodes The saturation treatment of Soupault and Debove, combined with the classic principle of small, frequently repeated meals, has been introduced into the United States by Sippy, where this treatment bears his name

Prepared chalk and calcinated magnesia may be combined with sodium, bismuth, kaolin, talcum, etc., in various proportions suitable for the given case Anti-acid agents having "a purely local action" have been recommended by Greenwald These are the *neutral tri-basic phosphates of calcium or magnesium* The first is constipating,

the latter laxative. They are given at the dose of one to six grams, three times daily before meals in a little water.

Sodium phosphate (one to two grams), like sodium bicarbonate, should never be given alone, it being a secondarily stimulating alkali, to such an extent that Hayem employed in hypopetetic gastritis. Here is a complex formula that I am prone to employ, it contains coatings, anti-acids, absorbents and is anti-spasmodic and analgesic.

R
 Bismuth carbonat
 Magnes hydrat
 Phosphat. tricalcic
 Calci carbonat præcip
 Kaolin
 Charcoal Æ, 20 grams
 Pulv belladonnæ, 20 centigrams
 Codeine, 10 centigrams

A teaspoonful of this powder in water is to be given at the onset of pain, and is to be repeated every two hours during the acute painful episodes.

It is hardly necessary to say that any of the bismuth salts may be given at the same time in powder form or in mucilaginous potions, in proportion and combination easy to vary, the amount of bismuth depending on the acuteness of the episode, the quantity of magnesium being indicated according to the constipation or diarrhœa present.

(3) *Diet*—There is not one diet for gastric ulcer. Many cases—under the influence of treatment—will improve with a mediumly severe diet which does not contain any manifestly irritating food-stuffs, in other patients the acute episodes are accompanied by so great intolerance that even milk cannot be borne. When one reads certain papers on this subject, one cannot but feel that the ideas put forward are not sound, I refer to exclusive, systematic diets used in all cases and given in fixed progression. I do not believe that gastric ulcer is a lesion amenable to treatments carried out in series.

Other than in extremely acute episodes or in hemorrhage, I never put the patient to bed and allow him to eat easily digestible food in sufficient amount, always ready to resort to a stricter diet if food is not well borne, although in reality this is not often the case. Therefore, in principle—excepting after hemorrhage—the following

foods are allowed, naturally combined with a careful treatment. Raw or soft boiled eggs, or eggs *à la neige* with the white and yolk or the yolk alone. Boiled or uncooked milk, or partially evaporated, also curdled by adding some rennet, but I do not give keplin or milk curdled by exposure to the atmosphere because they are acid. Yoghurt is usually, but not invariably, well borne, it is better not to give it by itself on an empty stomach. Pure fresh cream and fresh butter. Thin soup which can be thickened by vegetables, passed through a sieve, milk soup containing cereals, such as cream of rice, barley, maize, sago, etc., *fresh* spaghetti of the finest quality only. Milk puddings, broths containing sorgo flour. The following is a recipe for making sorgo broth. Mix a dessertspoonful of sorgo flour in a little cold water and afterwards mix with about 180 c.c. boiling water, then boil over a slow fire for forty-five minutes to one hour to make it thick, mucilaginous and without lumps, then add milk to thin it and flavor according to taste. This is both a food and a mucilaginous coating for the stomach. Potato purée (passed through a sieve) makes a nice dish.

Here is the recipe of an excellent custard as made in Brittany. Half a pound of flour, six ounces of powdered sugar, four eggs and a bowl of milk. Mix the flour and sugar, add the eggs and mix together until a smooth paste is made, then add the milk very slowly, pour the mixture into a mould and put it in an oven with a hot fire at first, then a low one. The original recipe calls for rum, but this should not be used in cases of gastric ulcer.

Powdered meat, fish, poultry or calve's foot jellies are to be added to the diet list, but as soon as possible fresh fish—small trout, etc.—in melted butter or with a cream sauce, or filet of sole in purée, are to be given. Slightly salted lean ham in thin slices, brains, calve's head and sweetbreads are not to be ignored. Then little by little, beef, mutton, lamb and lean pork may be tried, always grilled.

The preparation of all dishes served is of the utmost importance, at the beginning all fried dishes and condiments are to be strictly forbidden, later on condiments such as vanilla, caramel or cinnamon may be added in desserts. *Fresh* butter *ad lib* and olive oil, when well borne, may be freely given, even on an empty stomach before meals, but food cooked in oil is to be prohibited as the intimate

mixture ensuing from the cooking disturbs digestion. Exceptionally, milk and oil in emulsion are well borne (Euriquez and Carré)

It may be well to give four meals a day, so that the stomach will not be overloaded. A larger number of fractional meals can only be considered when the patient is obliged to remain confined to his room. I am, however, opposed to this constant solicitation of the stomach which is one of the characteristics of Sippy's treatment.

On the other hand, here are some strict diets to be resorted to in acute episodes with intolerance for food, which some carry out systematically in every case, where I do not.

Milk Diet—Milk given in small amounts at a time—a teacupful at the most—at regular intervals. A third of a quart to begin with, slowly increased to two quarts in twenty-four hours. At the beginning the milk may be diluted with ordinary water or Evian water. Vichy water makes the milk less digestible.

Lenhartz's Diet—At the very onset of the acute episode, even with hematemesis, feeding is commenced. On the first day 200 c.c. of milk and two eggs are given. Then the quantity of each is increased rapidly, so that by the end of the first week the patient partakes of eight to ten eggs in twenty-four hours. The eggs are beaten with the white, cooled on ice, and wine may be added. On the sixth day, finely scraped raw beef is added with the eggs, at first 35 grams are given and on the next and following days, the amount is doubled and then progressively increased. On the seventh day, rice in milk, and on the next, zwieback, on the tenth raw ham and butter are given.

Senator's Diet—This comprises a very mild protein content, but with gelatine, sugar and fats. Fifteen or twenty grams of pure white gelatine are dissolved in 200 c.c. of water to which 50 grams of oleosaccharate of lemon is added. The food thus prepared is taken in the twenty-four hours with 250 c.c. of cream and 30 grams of butter. The gelatine may be replaced by other similar substances—calve's foot—while olive oil may be substituted for butter.

Jarotsky's (Moscow) Diet—This only comprises white of egg and butter (beginning with one white of egg and 20 grams of butter, progressively reaching ten whites of eggs and 180 grams of butter), the egg being taken in the morning, the butter in the afternoon. During the first week the patient is allowed no fluid, not even water.

Coleman's diet is derived from Jarotsky's. Olive oil and butter

form the basis. Fresh, unsalted butter should be used. As to proteids, whites of egg are given. Carbohydrates are given in the form of glucose enemata. To prevent emaciation sodium chloride is also given *per rectum*. If the enemata do not control thirst, the patient is allowed to drink a moderate amount of water. From the fourth to the sixth day, feeding by mouth is begun—white of egg, olive oil and butter. The egg should be given alone, because when taken with fats the albumin remains in the stomach for a long time. The intervals between meals should be as long as possible, not less than two hours.

The first feeding consists of from 45 to 75 c c of olive oil and three to four whites of egg mixed with a little water and then beaten up. The amount of olive oil is progressively brought to 150 c.c. and the eggs to six or eight. If the oil is distasteful to the patient, fresh butter is given instead.

Sippy's treatment is, as I have said, derived from Soupault's practice. From 7 A M to 7 P M, a feeding is given every hour composed of 50 c c of milk and of cream. After two days of this diet a boiled egg is added, or a little bread and butter. One hundred grams of either rice or flour may be added to one of the afternoon meals. Thus, during the first week of treatment the patient gets besides his twelve milk-cream feedings, two or three boiled eggs (one at a time) and from two to three hundred grams of rice or flour. Besides, thirty minutes after each feeding one of the following powders is given alternatively.

R
Magnesii
Sodii bicarb aa, 50 centigrams
S For one powder

R
Calcii carbonat., 50 centigrams
Sodii bicarb, 150 grains
S For one powder

The stomach is emptied with the tube every evening.

Jarotsky's diet, modified by Coleman, appears to me the most interesting of these strict diets if a little less mathematical inflexibility in respect to the feedings was introduced. Two things are to be kept in mind in this treatment, *viz*, the tolerance of ulcer patients for oil and the rectal drop-by-drop glucose solution during restricted

feeding Before the war, I fed ulcer patients with glucose solutions *per rectum*, combined with injections of hypotonic glucose serum (300 c.c. to 1000 c.c. per injection) as recommended by Fleig, of Montpellier, which gave good results As to butter, cream and pure olive oil (or beaten up with whole eggs), sugar or milk, these are articles of diet most valuable in gastric ulcer, while at the same time they have a marked calming effect

To sum up it may be said that in those cases requiring a temporary strict diet, the best seems to me to be milk, to which is added very pure olive oil, butter and sugar, when the latter is tolerated, otherwise a glucose solution given *per rectum* by the drop method This diet is always to be associated with the exhibition of anti-spasmodic medication and gastric dressings (coatings)

Other Treatments—Numerous writers have tried *proteino-therapy*, their object being to treat the ulcer by proteic shock *Radiotherapy*, as an adjuvant to medical treatment, has given some interesting results to E. Piot and others

Anti-syphilitic Treatment—Some writers regard the majority of cases of gastric ulcer as being syphilitic, to be cured by specific medication My own practice has not favored me in this respect, for it has been extremely rare for me to have obtained any improvement in my ulcer cases by anti-syphilitic treatment.

Phases of Quiet between the Acute Episodes—This period is of capital importance, because the patients consider themselves cured They should be made to understand that their affection is composed of alternatives of sedation and acute attacks, that the quiet phase is not one of recovery and therefore they should continue treatment

Anti-spasmodic treatment should be continued by the exhibition of belladonna Gastric hypersecretion is to be treated by gastric coatings, while Hayem has shown the advantages to be derived from dialytic medication

R

Sodii bicarb., 2.50 grams.
Sodii sulphat., 3 grams
Sodii chlorid., 1 gram.
Aquæ, 1000 c.c.

This is to be taken in progressively increasing doses, increasing 50 c.c. each time, to finally reach 250 to 500 c.c. a day The solution

is heated and taken in three portions in the morning with the stomach empty It is to be taken daily for one month and then stopped for two or three weeks

The diet, too, must be carefully supervised Little salt should be allowed, food must be masticated thoroughly, otherwise the particles have a mechanical traumatizing action on the stomach

The following articles of food are prohibited Fatty soups and fat broth, Hors-d'œuvres, hard eggs and omelette, sausage, salted meats and bacon (cooked ham may be allowed if of fine quality), meat pies, canned game or fish, all shell-fish, with the exception of oysters, but they must be well masticated and not swallowed half chewed, raw salads, radishes, green olives, mushrooms, truffles, onion, garlic, capers, etc., fruits used as vegetables—tomatoes, cucumbers, melon, asparagus, egg-plant, summer squash—are to be avoided unless very young and tender, cabbage, cauliflower, sour-kraut, carrots, turnips, sorrel, salsify, string beans and spinach, unless made into fine purée

Fatty fish, fish canned in oil, duck, goose, pigeon, turkey and capon, dark game or highly gamy birds, all fried dishes, fatty sauces—tartar, mayonnaise, béarnaise, etc., all kinds of pickles, mustard and other condiments.

Apricots, pine-apple, cherries, apples, pears, plums, all nuts and berries, raisins and dried figs Grapes are allowed without the skin and with the seeds removed All heavy, fat pastry, candy, and candied fruit Bread and very little salt Turkish coffee may be allowed as it is much less stimulating than other ways of preparing it.

The use of pure wine, cider, all forms of alcoholic drinks, charged mineral waters, Vichy water with milk, if taken as a drink during meals, is a common dietetic mistake

Eat slowly, masticate carefully, drink little at a time

Food Permitted—Thin soups, vegetable soups with spaghetti, milk soup without bread, etc. Tapioca, sago, arrow-root, vermicelli, barley soups and porridge Clear chicken soup with fat removed

Meats—It is to be noted that the use of meat depends upon the patient, some tolerate it well, others do not Beef, mutton and lamb grilled or roasted without sauce, eaten hot or cold, finely hashed or reduced to pulp if necessary, or raw, mixed with scrambled eggs

or potato purée Brains, calves' head and sweetbreads boiled, lean ham, grilled rabbit or pork

Oysters, white fish—flounder, perch, turbot, sole, cod-fish, etc.—boiled or fried (remove the skin if fried or grilled) served with mousseline sauce or melted butter

Lean poultry—chicken, guinea chicken, quail, pheasant or partridge if young and fresh Meat, poultry or fish jellies *Fresh* eggs, soft boiled or scrambled Thoroughly cooked macaroni, vermicelli, etc.

Green vegetables Thoroughly well cooked, reduced to a purée and passed through a fine sieve, to which are added the yolk of eggs and very fresh butter—water-cress, turnip, endives, young carrots, artichoke, beans, young spinach, green peas, chicory, lentils, dandelion

Cooked fruits without skin and with little sugar—peaches, grapes, strawberries and fresh figs

Home-made rice, tapioca, barley, oat or corn puddings Rice or sago cakes, custards, creams, etc

Bread crust, old bread toasted, Graham bread, zwieback

Drink ordinary water (300 c c at a meal) or Evian water, or hot infusions of tea, orange flowers, maté, camomile and linden

In each case one must be guided by the patient's individual tolerance Leven says "One must not say to a patient 'Choose the food you can digest.'" I am not of his opinion. I know dyspeptics who can only digest pork, others who support beef and not veal No theoretical consideration can apply here.

The patient should rest for thirty minutes after each meal, he must avoid all excess in work and keep early hours All business worries must be eliminated Genital excesses likewise Tepid sponge baths are to be taken in the morning without a rub, followed by thirty minutes of rest.

Operated Ulcer—After excision of an ulcer, the diet usually should be maintained for about one year and it is important that the patient should know this beforehand in order to avoid any surprise on his part

After gastro-enterostomy, if pain continues, the same strict diet is to be observed as in an ordinary acute episode The painful phenomena may *sometimes* retrogress, attacks of perigastritis around an ulcer may disappear, likewise the symptoms, while at the same time

the X-ray signs disappear. If medical treatment is without avail a radical operation becomes imperative.

Sometimes excision is impossible on account of adhesion to various organs—the pancreas, etc.—and this is yet another reason why the ulcer should be excised at the earliest possible moment, because adhesions are certainly less serious than cancer, although they may make the patient's life miserable in some instances.

When the pain is due to adhesions, sun or mud baths, diathermy and radiotherapy are indicated. Paravertebral injections of novocaine serum may be essayed.

Lastly, when pain is incessant and medical treatment powerless, surgical interference on the roots or sensory nerves may, it seems to me, be proposed.

Operative Indications in Gastric Ulcer—Too many ulcers are treated indefinitely medically when there is no chance to cure them, because new conditions develop—stenosis—which alone can be dealt with surgically and to prevent adhesions, acute perigastritis, perforation, and, above all, cancer transformation.

There are certain *absolute* indications. An ulcer with clinical and X-ray signs of pyloric or mediogastric stenosis which is not improved by atropine or, perhaps, anti-syphilitic treatment is a strictly surgical affection. This applies also to an ulcer with daily continued pain that does not improve by medical treatment. Repeated hemorrhage is an indication for operation, but not during the bleeding.

Certain conditions, although not having the above inevitable characteristics, are such elementary *indications of prudence* that they appear to me to be quite as urgent. A patient over forty years of age who is not unquestionably cured by medical treatment, whose appetite—which has been normal—decreases and who becomes emaciated in spite of sufficient food, without patent or occult bleeding, should be operated on without delay. All cases of persistent occult hemorrhage should be operated on.

Distinct, Although Not Urgent, Operative Indications—An ulcer without organic stenosis of the pylorus, but with pyloric spasm resistant to anti-spasmodic treatment, comes under this head.

Indications Derived from Extra-medical Treatment—The social condition of the patient may prevent him carrying out proper medical and dietetic treatment, so that surgical interference is necessary.

THE BEST DIET

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As THE knowledge of mankind increases, it is becoming more and more surprising that when there is no definite illness (especially of the digestive tract) most people go on eating and drinking whatever pleases them. If it were generally realized how much *good can be* done the human race by fuller knowledge of the common dietetic facts and a proper *voluntary* regulation of the eating, mankind would live better and longer. This is in line with Stitt's observation that "Studies in nutrition hold in prospect results of greater benefit to mankind than any line of current investigation pertaining to public health."

Observations and theories about diet appeared early in the history of medicine, but were of little value until the last century, when the work of von Liebig and the early organic chemists showed the value of carbon, oxygen and nitrogen in the food and thus laid the foundation for the *science* of dietetics. Later came the studies of digestion and assimilation which are still helping, and with this came an appreciation of the value of the inorganic constituents in the diet.

These inorganic constituents (water and various mineral salts) are now pretty well known and appreciated. Water is perhaps most valued for it is generally known that a plentiful supply of this solvent is necessary for digestion, assimilation, elaboration, metabolism and elimination—for practically all the activities that go on within the body and so for the well-being of the body as a whole. The minerals in the food act in less obvious but just as essential ways. Calcium, iron, sodium, sulphur, iodine, chlorine, phosphorus, etc., are required in all the organs or many of them, and are supplied through only the food and drink.

It is well known too that digestion proceeds better when there is plenty of bulk to the food consumed. Therefore people generally endeavor to consume some "roughage" or other indigestible material like the cellulose in cooked or uncooked fruits or vegetables. But while the digestive processes are fairly well understood, there is yet

much to learn about the action and reactions of the foodstuffs after they leave the digestive tube, *i.e.*, metabolism

With the history of dietetics outlined in the foregoing paragraph, all physicians are reasonably familiar, but recently some new factors, properties, or elements in the foods have come to our knowledge. These are the "vitamins" and so far they are but imperfectly understood as indeed are the hormones, the enzymes, the toxins and anti-toxins. Our present knowledge of the vitamins may be summarized as follows

(1) Vitamin A is soluble in fats and is found in cod-liver oil, in glandular organs, in eggs and milk, in cabbage, lettuce and similar leafy vegetables, and in carrots and tomatoes. When it is deficient in the diet, xerophthalmia, night blindness and a general lowering of body resistance appear. This may be called the anti-ophthalmic vitamin.

(2) Vitamin B is water soluble and is anti-neuritic. It exists in yeast, wheat germ, leafy vegetables like cabbage and lettuce, in fruit juices, tomatoes, and milk and eggs. Its presence prevents polyneuritis (*beri-beri*), malnutrition, and disturbances of the appetite, digestion and the endocrine balance. Observations and experiments on fowls and on the Japanese people since this century opened led to our knowledge of the vitamins and this B was the *first vitamin scientists recognized*.

(3) Vitamin C is also water soluble, it is anti-scorbutic and is found in the juice of fresh oranges and tomatoes and in glandular organs. Long before we knew anything about the vitamins it was known that scurvy developed when armies and polar expeditions were not supplied with fresh vegetables and fruits or their juices. The explanation of this was found by animal experimentation, for guinea-pigs and monkeys are very susceptible to this disease.

(4) Vitamin D (like vitamin A) is fat soluble and prevents osseous changes or rickets. The best source of it is the oil in the livers of cod and other fish. Here the fat-soluble vitamins are originally synthesized by the diatoms and other minute marine organisms which are the indirect foods of the large fish. Possibly a regrouping of the vitamins will put in one class the fat-soluble varieties.

(5) Vitamin E is associated with lettuce and the embryo of

wheat and other grains, it has been called the "anti-sterility" vitamin, but is less known than the others

The vitamins are apparently chemical substances, they are plentiful in every well-planned diet. In fact, it is probable that a person eating the usual diet of meat, milk, eggs, salads, vegetables, and fruits, will be supplied with enough vitamins for normal growth and development. Cooking often impairs or destroys the vitamins in the food, however much it improves the taste, digestibility, etc. They are absent in many highly processed foods and their deficiency or absence brings about disease. Thus we are recognizing the deficiency diseases (rickets, scurvy, beri-beri and pellagra) and from this angle approaching a knowledge of what a proper diet should be. We should always be looking for any causal relations between foods and disease, for such observations and investigations may throw light on our search for the best diet.

After much careful study and observation, rational rules exist for the diet in diabetes and gout, less surely do we know how to feed people with peptic ulcer and other digestive diseases, the régime proper for kidney diseases is not at all clear, and our ideas for the foods most suitable in blood diseases and metabolic disturbances are still very hazy. An all around inadequacy of food has much to do with the development of tuberculosis, while goitre is really a deficiency disease caused by a lack of iodine in the food and drink.

Hospitals and sanatoriums carefully arrange the diets of their patients, the army regulates the rations of its soldiers, such institutions as boarding schools, orphanages and prisons strive to furnish the best possible meals for their charges. Proper arrangement of the diet is an important part of the question of public health, it is the chief concern of departments of our national and state governments, and it is the subject of many articles in the magazines and newspapers. It is becoming more important to the whole medical profession, for one of the chief and most promising functions of preventive medicine is the instruction of people as to what constitutes a suitable diet.

Our most intelligent patients are often not actual *patients* but rather "health clients," anxious to get our advice about many things, including their daily meals. Naturally the greater our knowledge of dietetics, the better is the help we can give. Such advice is

sought from all physicians and they should all be prepared to give it intelligently. We must recognize dietary mistakes and avoid an old fault of physicians who are often unduly influenced by their own likes, dislikes and idiosyncrasies. On the other hand, we must combat the peculiar pseudo-scientific ideas which are nowadays appealing to so many people. Cranks and faddists are urging people to live on uncooked foods only, to avoid meats, or to avoid certain common combinations of foods, restrictions which are unnecessary and often unwise.

Manifestly our changed and changing manner of life calls for modification of the diet. Only a few generations ago most of our people lived on farms or in small towns, exercise and open air played a larger part in life than now when everything except the automobile tends toward indoor life. Even that calls for less exercise, if for more fresh air. Those who do physical labor or get much exercise may more freely indulge their appetites for food than may brain workers who realize that heavy meals, especially at noon, impair the mental power. When the office man goes on his vacation and increases his activity he finds he needs more fuel, but when the farmer moves into town, or any active worker begins a sedentary life, does he eat differently, or does he go on until nature rebels and the health is impaired?

The enforced simplicity of our menus during the World War taught civilization some things it should not forget. When Denmark, for example, found it necessary to regulate the food supply of its people, a commission headed by Hindhede, of the Nutritional Laboratory of Copenhagen, was appointed to arrange a proper diet for the nation. This was carefully worked out and consisted of milk, some butter, bread of whole rye flour mixed with wheat bran, greens, potatoes and barley porridge. As a result of this simple diet (and probably the non-use of alcoholic beverages) the health of the people improved so markedly that Hindhede concluded that such a simplified diet was beneficial. It certainly reduced the sickness and the death-rate among the Danes.

McCarrison and Halliday call attention to the rarity of appendicitis, peptic ulcer, acute cholecystitis, gall-stones and cancer in all its forms among the natives of the Punjab. They live on the products of their fields—whole wheat bread, dal (chick peas), raw vegetables

(like carrots, cucumbers, turnips, radishes and onions), fruits (like melons, mulberries, prunes, figs, mangoes, pomegranates, bananas and oranges), sugar cane, dairy products (milk, buttermilk, curds), green corn, and native spices (turmeric, coriander, peppers and garlic). Little meat is consumed and all is in marked contrast with the diet of the English residents and those who consume larger quantities of meat, much highly milled flour, and canned, dried or preserved fruits, vegetables, meats and fish.

There are people like the Eskimos, many Chinese and certain savage tribes whose menus are, to say the least, very unusual but these are climatic or local exceptions.

It seems that people who visit our hotels and restaurants eat less and more simply than they did a generation ago. The International Stewards' Association notes that the simple table d'hôte meal is returning to favor, taking the place of the more elaborate concoctions like chicken à la king, lobster Newberg and such foods. For the brain workers, meats, griddle cakes and pies are not so often a part of our breakfasts, but cereals (often the light and ready-to-serve kinds), toast, eggs, and coffee are frequently enough, the noonday luncheon, especially if eaten away from home, is usually lighter than the cooked supper of former days, while dinners (in the evening or at noon) are better arranged and lighter.

Thus we see a gradual improvement in our habits of eating, but when we consider the amount of knowledge on the subject so laboriously accumulated, and the agencies spreading this knowledge before us and urging us to profit by it, we see another example of the inertia of mankind. Custom and convenience are always hard to overcome and families cling too closely to their dietary habits, even to the second and third generation. Academic knowledge makes slow headway against the old customs, and our nerves of taste are often false guides when science points a better way.

Probably our most common gastronomic sin is the overuse of rich, concentrated and highly seasoned foods. This leads to chronic constipation and overweight. Most people understand the dangers of constipation and combat it seriously, yet too many still look upon obesity as a joke and do not appreciate that fat people furnish most of the cases of diabetes and other diseases connected with metabolism. It is probably more than a coincidence that the increase of diabetes

mellitus in the past generation accompanies the enormous increase in the consumption of sugar in candies and other sweet foods. Fashion now looks with special favor on slender women and women now have a fear of gaining weight. Limiting the calories consumed is of more use in reducing weight than increased exercise.

The meat eating races rank high in invention and initiation, and an albuminous diet contains plenty of lime, phosphorus and the fat-soluble vitamins, but a vegetarian diet increases the physical endurance and causes less nervousness. The races which live on a generous all around diet with plenty of albumin are best developed physically.

Not all modern and so-called "sophisticated" foods are to be condemned, proper preparation may wisely save our time without impairing our digestions and may really make for efficiency. An example is found in our American pre-cooked or dry breakfast foods. These are starchy foods, sophisticated to a high degree, yet the starch they contain is well prepared for digestion and they are usually eaten with plenty of milk or cream.

For a healthy adult enough carbohydrate, protein and fat (the energy-producing foods), with sufficient mineral salts and water, should be consumed to supply the body's needs, which vary with the age, size, activity, climate, digestion, etc., of the individual. But we now know that a proper diet should contain something else than these five constituents which were once supposed to provide everything necessary for growth, energy and heat. In addition enough vitamins should be consumed, and if plenty of the vitamin-carrying foods are taken everyday, provision will be made for this. Care should be taken that enough cellulose, bran, etc., or what we Americans call "roughage," is used. Most civilized people eat too much starch and sugar in the form of fancy baked or "made" dishes and candies, a freer use of fruits, salad, and leafy vegetables would balance the diet.

Judging from war observations, from the diet of primitive peoples, and from the knowledge accumulated on this subject, a lacto-vegetarian diet is preferable, at least it should form the basis of the best diet. But variety is just as necessary in our food habits as in our mental, physical and social activities. Healthy bodies are necessary for the best physical and mental work and if we eat the necessary proteins, fats, carbohydrates, mineral salts and vitamins we are living wisely.

ACTION OF QUININE AND QUINIDINE UPON THE HEART

By H VAN WELY, M D

Senior Physician to The Hague Hospital, Holland

THE influence of quinine, or better quinidine, on the heart and conductive system is at present occupying the attention of clinical physicians and of physiologists, because nowadays this remedy has been more and more used in the treatment of certain diseases of the heart

Already decades ago quinine was prescribed in combination with digitalis, and the old clinical doctors were very content with this combination

In 1918 Wenckebach in a publication, "Über Chinin als Hersmitel," reported its action on the heart, and especially did he advise it in patients suffering from extrasystoles. And really every one who has prescribed quinine to patients with nervous extrasystoles will have seen its success, but he, however, will also have observed cases in which the remedy worked unfavorably and depressed the heart even when given in slight doses

Several times I observed this in patients suffering from extrasystoles of myocarditic origin

A freer application quinine got when Wenckebach reported a case in which auricular fibrillation disappeared and gave way to a normal rhythm after the administration of one gram of quinine

As you already will know, Trey, on the occasion of Wenckebach's publication, investigated the different cinchona alkaloids and found quinidine as being the strongest working substance

Since then quinidine is not only used all over the world, but it is given now in far greater doses than ever before, and every one interested in the treatment of heart patients now has come to try in cases of fibrillation to get back a regular heart action by the administration of quinidine. First of all, it is necessary to form a sound idea of its action. We won't insist on the theories given during the last years to explain the causes of auricular fibrillation.

According to the investigations of de Boer and Lewis, we know

that in this disease a wave of contraction passes on by fits and starts through the auricular muscle, and that this wave is in a state of continuous circulation if the crest of the wave will find muscle-fibres, which are no longer refractory and may become excited

Lewis believes this wave to be circulating around one or both *venae cavae*

So it is required that between the wake of the wave and the crest responsive muscle-fibres are present, otherwise it cannot proceed, as it will end at this boundary of irresponsive muscle. If we can obtain this state of things an end will be put to the circus wave and the auricles again will answer the sinus knot. The normal rhythm has been restored

What do we know about the action of quinidine on the heart?

(a) Quinidine diminishes the contractility of the muscle

(b) Quinidine diminishes formation of stimuli (though in slight doses prescribed we obtain an increased frequency by the paralyzing of the vagus)

(c) Quinidine diminishes the excitability of the heart-muscle (favorable result in extrasystoles)

(d) Quinidine diminishes the conductivity of the muscle as well as of the conductive system itself

(e) Quinidine represses the recovery after the contraction, thus lengthening the refractory period

The last two qualities are of great importance for therapy, by means of the diminished stimuli conductivity in the auricular muscle the wave will pass on more slowly, with the result that the gap between wake and crest will become greater, and this wave does not become short-circuited. The gap, however, becomes smaller by lengthening the refractory period, with the result that the crest of the exciting wave runs into refractory muscle and is extinguished. Now it depends upon which of the two qualities of quinidine will predominate. If the latter predominates, the result of our treatment will be successful, and fortunately this is rather often met with.

As an example of a successful treatment I give the following electrocardiograms (Fig 1). This patient received during three days 3 x 400 mgr of quinidine, after which on the third day the second electrocardiogram was taken.

A normal *P*-top is seen, preceding the ventricular complex, but on these curves I will show something to you that I'll discuss further on, namely, that this *P*-top is placed at a greater distance (0.24") from the ventricular complex than normally

Here we may expect an inhibitory action of quinidine on the conductive system

Similar observations are to be found in literature, but very great attention was not paid to it, and yet it is of very great importance, because nowadays, if normal rhythm has reentered, the use of quinidine is prolonged to continue this state of things

While some investigators have not often seen this prolonging of the *P-R* interval, I have noted it rather frequently

Quinidine is quickly excreted, so if we want to demonstrate this lengthening an electrocardiogram should be taken immediately after the sinus rhythm has reentered. In order to investigate if this lengthening of the *P-R* interval has been due to quinidine action I administered it to healthy people, but no considerable lengthening was found. The following electrocardiograms (Fig 2) give a curve of my heart action before and after use of 3×0.4 gr of quinidine, and you see that *P-R* remains about 0.19 second

The electrocardiograms of Fig 3 are of a patient recovered from pleurisy. Here there was no lengthening of the *P-R* interval

Auricular fibrillation may be divided into two groups. Those of neurogenic and those of myogenic origin

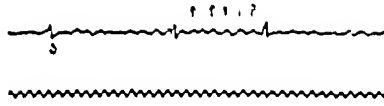
The electrocardiograms of Fig 4 have been taken from a patient belonging to the first group. He did not have any enlargement of the heart dulness, no valvular defects, no decompensation. Fibrillation was stopped by administering quinidine, after that the patient was given another dose, under control of the electrocardiograph. You will see at once that there is no alteration in the *P-R* interval, although large doses of quinidine were given.

Quite another result the investigation had in a patient with myogenic origin of the affection (Fig 5). She was suffering from a mitral stenosis and dilatation of the right ventricle. She was taken into my ward in a very decompensated state

After the decompensation had been treated by means of digitalis, quinidine was given with great success, but 5×0.4 gr was necessary to

Fig 1

2 I



2 II

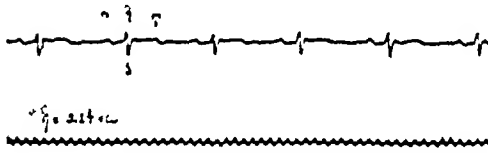


Fig 2

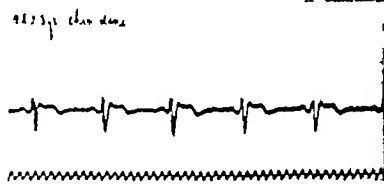
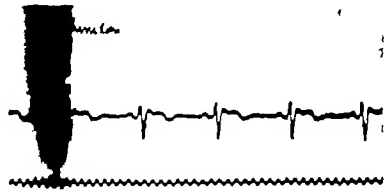


FIG 3

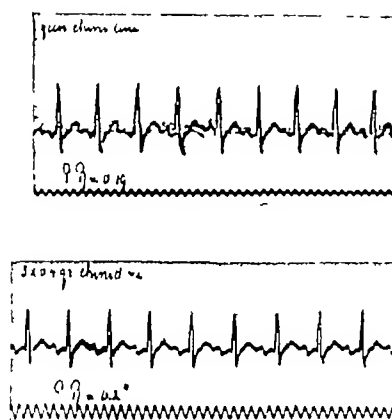


FIG 4

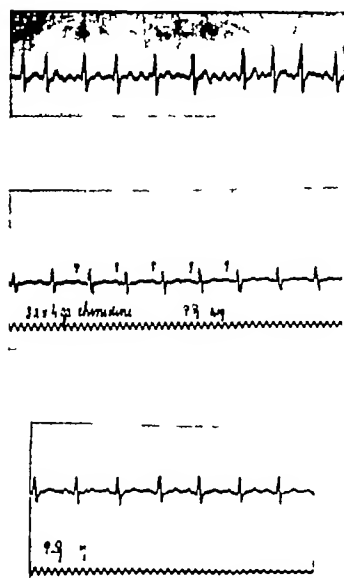


FIG 5

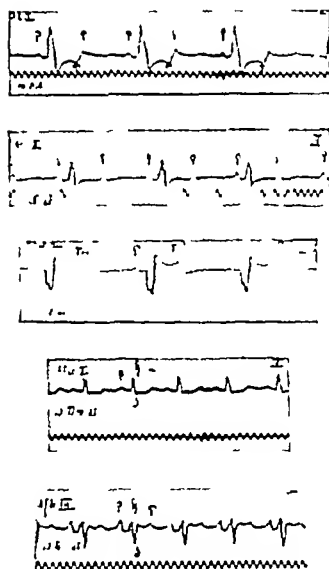


FIG 6

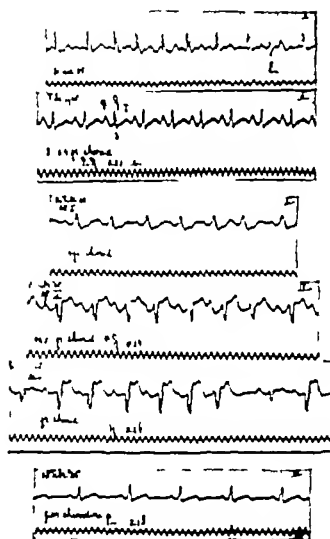
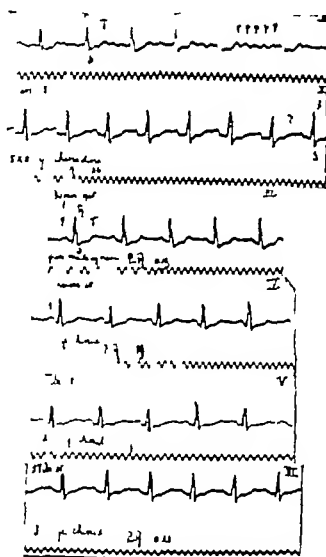


FIG 7



The reader will find an explanation of the electrocardiograms given in the text

obtain this result, and in the curve of January 4, 1925, a very distinct *P*-top is visible, the *P-R* interval, however, being 0.26 second

In the electrocardiogram taken one month later, during which time the patient had not taken any quinidine, whilst the pulse had remained regular, a nice *P*-top is demonstrated, that only 0.19 second later is followed by the ventricular complex

I then gave, very carefully, increasing doses up to 3×0.4 gr of quinidine per day, and you can very distinctly see the increase of the *P-R* interval up to 0.23 second

The next series of electrocardiograms (Fig. 6) will show still plainer the influence of quinidine on the conductive system

In this patient a regular sinus rhythm could be obtained after administration of 3×0.4 gr of quinidine and you immediately will see the *P*-top extending at a distance of 0.21 second of *R*

Four days later I gave 4×0.4 gr of quinidine, she did not feel anything abnormal, did not have any peculiar sensation, and only by taking an electrocardiogram could be detected what had happened in the heart

First of all the *P-R* interval has been increased up to 0.24 second, and secondly, the *P*-top is followed by an abnormal ventricular complex, in which the distance *R-S* is no longer 0.08 second, but 0.16 second. Lewis mentions in his book, "Mechanism and Graphic Registration of the Heart Beat" (pages 78 and 79), curves obtained in dogs after cutting the left or right bundle of Tawara. If we now study these electrocardiograms of Lewis, we find that after the *P*-top a wholly altered ventricular complex, with lengthened distance *R-S*, has taken rise and besides the picture of a lævo- or dextrocardiogram

The stimulus to contraction passes undisturbed through the intact right or left bundle and flows along the muscle-fibres to that part of the heart in which the bundle has been cut. So it is very clear without further comment that *R-S* must be longer than normally, and that the deflections of the galvanometer become altered

After cutting the left bundle we find a high R_{III} , by cutting the right bundle a deep S_{III} , often split tops and besides the *T*-top in opposition to the greatest deflection. Blocking of one of the bundles of Tawara is also to be found in clinics and is very easily detected by electrocardiographic methods

In 1910 they were described by Eppinger and Rothberger, afterwards by Winterberg and Lewis

In the *Quarterly Journal of Medicine* (October, 1925) Cowan and Bramwell reported twenty-four cases. Out of these twenty-four cases only once the left and twenty-three times the right bundle was found to be blocked. They attributed this to the fact that the left bundle is more heavily built and has a more adequate blood distribution, by this the right bundle happens to be sooner blocked than the left one. If we now consider our electrocardiograms it will be obvious that the right bundle is blocked. In consequence of this block we see the lengthened distance $R-S$, the deep S_{III} and the T opposite to greatest deflection. In current literature curves are represented which very much resemble this, and which are attributed to an "arborization block." I believe that we can safely keep the intraventricular block of the finer Purkinje fibres out of consideration. The different ventricle complexes are too regular for that.

Every one taking an interest in this I should advise to study the article by Perri from Milan in the *Archives des Maladies du Cœur*, December, 1925. However it may be, when I stopped quinidine, not only the block abolished, the ventricles contracted normally, but also the $P-R$ distance became shorter and reached the normal of 0.18 second.

So then, after the sinus rhythm has been restored, quinidine is to be continued, but a similar block may result and beforehand we do not know how much inhibitory quinidine action will be necessary for that.

Quinidine depresses the heart, especially the refractory state becomes longer, not only of the auricle muscle, but also of the ventricle muscle, and here lies a danger that must be faced.

The last series of curves (Fig. 7) is from a diabetic suffering of myocarditis. With a 1 to 2 heart-block, only one half of the auricle contraction is followed by a ventricle contraction, but even this ventricular contraction is abnormal. The long $R-S$ distance, the high R_I and the deep S_{III} , the T -top opposite to the greatest deflection again prove the presence of a bundle-block, and again here it is a right bundle-block. This condition was not stationary but changed with the normal one, of which the two lower curves form an example, and also sometimes there was complete heart-block.

The continuous changing, sometimes several times a day, in a state of block, may be very disagreeable for the patient, attacks of oppression, fearfulness and unconsciousness may be so dreadful that the patient appears as if he might die

Once I happened to produce a complete heart-block by giving slight doses of quinidine, the ventricles contracted with their own rhythm, forty-one beats per minute, the disagreeable attacks disappeared and the circulation became much better

In this patient I again tried to influence the conductivity by giving quinidine. The first day she got three times 0.2 gram without effect, the morning of the second day 0.4 gram, and the same morning she suddenly became oppressed, white, cyanotic and succumbed

At the post-mortem the left ventricle was found to be filled with blood, so it was a heart death (the further pathological-anatomical examination of the heart is not finished yet)

When death is caused by this remedy, how is this to be conceived?

Our countryman, de Boer, induced *ventricular* fibrillation in a frog's heart, being in a bad metabolic state (this had been caused by making the heart bloodless, by which a lengthening of the refractory period was produced), shortly after a normal contraction he stimulated just at the moment at which the muscle-fibres partly were refractory, partly excitable

Normally the conductive system spreads the stimulus to contraction equally over both ventricles and through the fine net of Purkinje fibres to all parts of the ventricle muscle at about the same time, which very likely is the cause that in the ventricle muscle, although it possesses a longer refractory period than the auricle muscle, fibrillation is seldom seen to enter. In our last case one of the bundles may again have become blocked, probably the right one, the excitation wave is traveling only to one half of the heart and then it is transmitted along muscle-fibre to muscle-fibre to the blocked part

however, now it does find muscle-fibres under the influence of quinidine, by which the refractory period became longer

If the excitation wave comes just at the moment that one part is refractory, another part excitable, a circulating wave will be produced in the ventricle muscle, just as in the frog's heart of de Boer. The patient will die of *ventricular fibrillation*.

But when the bundle-block entered spontaneously, without quinine, no ventricle fibrillation took rise, because the refractory state of the ventricle muscle had not been lengthened

Resuming, we see that in patients suffering from auricular fibrillation, who got back the sinus rhythm by quinidine, a prolongation of this remedy *may* cause a diminished conductivity in the bundle of His, that in such a case even a bundle-block *may* arise

This influence of quinidine especially is to be expected in patients in whom the auricular fibrillation is due to a myogenic affection

In connection with the probable cause of death in the last patient, there is reason enough to be very careful with this remedy in a patient who is suffering from myocarditis

RECTOSCOPE ESPECIALLY DESIGNED FOR USE IN THE INJECTION TREATMENT OF HEMORRHOIDS

By J. F. MONTAGUE, M D , F.A.C.S

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EXPERIENCE with the injection treatment of hemorrhoids has shown that the ideal instrument for use in connection with this treatment would be a simple, well-lighted, self-retaining, short rectal speculum that would give a lateral exposure as well as a direct view. Since I use the injection treatment for hemorrhoids quite extensively necessity proved the mother of invention and led me to contrive the instrument described herewith. Although it is specifically designed for use in the injection treatment of hemorrhoids it may, of course, be used for examining or treating any lower rectal or anal condition, such as cryptitis, papillitis, fistula and others. I have had such satisfaction with its use, as have others to whom preliminary models were distributed, that I believe general practitioners may care to know more about the instrument.

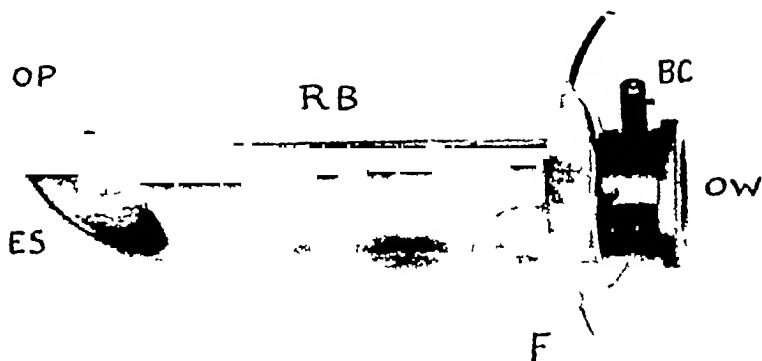
The device consists of two parts. Firstly, the rectoscope itself and, secondly, an inner lighting tube similar in principle to that employed in my rectosigmoidoscope. Because of the fact that the normal rectum is an empty organ we do not need an obturator. The only reason an obturator was ever included in the mechanical make-up of a rectal speculum was that, without any good reason, some surgeons insist on giving the patient a so-called "preparation" which consists of a cathartic the day before, an enema the night before and another enema on the morning of the examination. Little wonder then that, having reduced the normal formed feces to a liquid state, we should find residual matter in the rectum. As I have pointed out at length elsewhere in the literature, preparation is entirely unnecessary in all but an exceptional case. When preparation is omitted the rectum will usually be found empty or else will contain small particles of well-formed feces that can easily be packed off with a little cotton. For the reasons just stated I do not find it necessary to have an obturator in my rectoscope.

The rectoscope proper consists of an obturator point (*OP*), an examining slit (*ES*) which connects with a barrel (*RB*) at an angle. The obturator point is of a gently dilating shape and is very efficient in serving as a gentle means of insinuating the instrument. There is a deficiency in the inferior border of the instrument at the point, in the nature of an oblique elliptical slit (*ES*) which is concentric with the observation window (*OW*). By this arrangement vision is permitted not only directly ahead but also to a considerable extent along the wall of the lower rectum and anal canal. The flange noted at (*F*) serves as a handle, as a hilt and also to prevent rolling.

To aid in the inspection of the field visible through the rectoscope I have furnished it with an inner tube which fits snugly into the barrel of the rectoscope and has a darkened interior that successfully obviates reflection on the interior of the barrel. At the distal end of the inner tube there is a well-guarded electric lamp that gives abundant illumination. At the proximal end of this inner tube there is a swinging window. This carries a lens which magnifies $\times 4$ and protects against gas in the rectum and other possibilities. There is an electric connection for lighting the lamp mentioned and the current may be obtained either from a battery or from house current carried through a rheostat.

The rectoscope is used in the following manner. The outside of the instrument and particularly the tip is well lubricated with KY and the tip of the rectoscope is inserted in such a way as to enter horizontally, the barrel in the meantime being held high at an angle. After the anal canal has been traversed, as may be easily felt, the barrel of the rectoscope is lowered to a horizontal position and inserted up to the flange. The light is then turned on and it will be seen that one is in the ampulla of the rectum. By gently withdrawing the barrel and rotating it, almost any part of the lower rectum and anal canal may be viewed. After inspecting, if it should be decided to inject one or more of the hemorrhoids the window is swung open and with the aid of a syringe fitted with a goose-neck extension the hemorrhoid is easily injected under full view. Several hemorrhoids may be injected in this manner without removing the instrument. Since the instrument is self-retaining, owing to its shape, its parallel walls and its specially weighted tip, both hands are left free for the actual work of the injection.

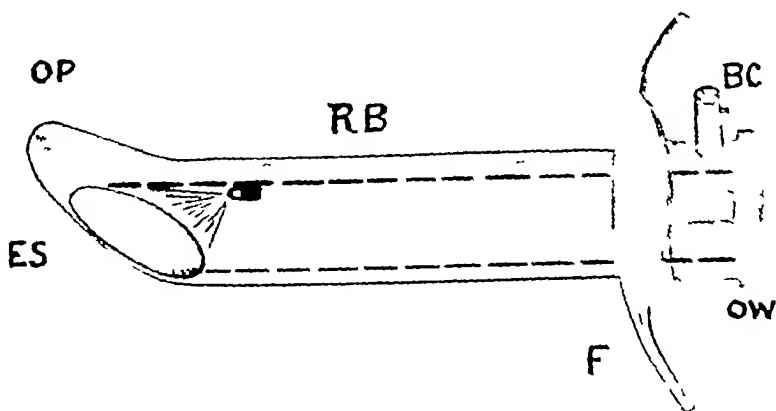
FIG 1



Side view of Montague rectoscope

OP—Obturator point ES—Examining slit RB—Rectoscope barrel F—on roll flange
BC—Battery connection OW—Observation window

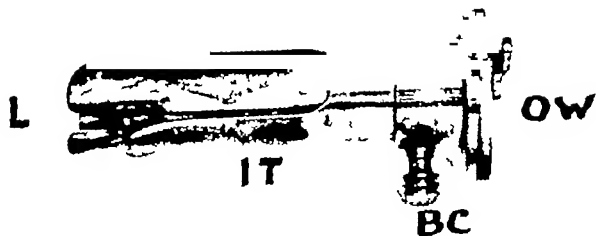
FIG 2



Phantom view

OP—Obturator point ES—Examining slit RB—Rectoscope barrel F—on roll flange
BC—Battery connection OW—Observation window

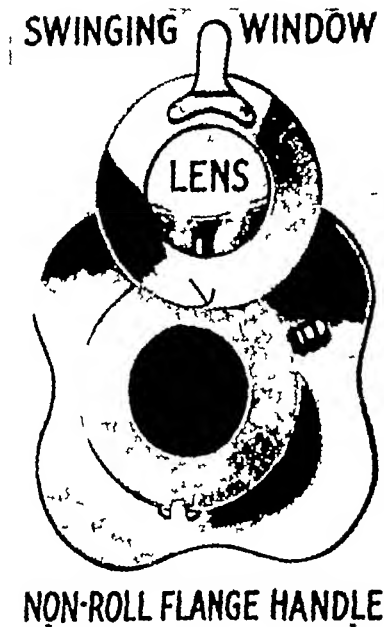
FIG 3



Inner tube light carrier of Montague rectoscope

L—Light *IT*—Inner tube *BC*—Battery connection *OW*—Observation window

FIG 4



End view of rectoscope

Following are the advantages I claim for my rectoscope

- (1) It is absolutely self-retaining, thus leaving both hands free to work
- (2) It obviates the need of an obturator and a handle
- (3) It is of reasonable diameter and because of this and its dilating tip is easy to insert and causes the patient no discomfort
- (4) It is easy to clean
- (5) It does not roll when placed on a table
- (6) It is electrically lighted
- (7) Experience has shown it to be ideal for the injection treatment of hemorrhoids

Medicine

DIFFERENT FORMS OF ARTERITIS, ESPECIALLY "PERIARTERITIS NODOSA" *

By FRANCIS HARBITZ, M D

Professor of Pathology, University of Oslo, Norway

COMPARATIVELY little is known about *arteritis* and its significance if we disregard *siphilitic* endarteritis and *tuberculous* arteritis in the meninges which are well-recognized entities. Otherwise little has been written about this disease until quite recently.

In various infectious diseases inflammatory vascular changes may occur as seen especially in the cerebral vessels in *influenza* with hemorrhages, which, however, seem to depend largely on degenerative changes. Of greater interest are the changes that have been found in the vessels of the skin in *exanthematic typhus* by E. Frankel and others, these changes involve the *capillaries* and *precapillary arteries* in most of the organs, with partly exudative and partly degenerative changes as well as necrosis.

Inflammatory and degenerative changes occur also in the small vessels—in capillaries and small arteries—in infections with hemorrhages and eruption in the skin such as *epidemic meningitis*.

Two years ago Professor Bruusgaard and Dr. med. Thjøtta described ¹ a case of gonorrhœa with general infection and gonococci in the blood and skin eruptions, and numerous gonococci were found in the endothelial cells in the walls of the small arteries and capillaries in the skin.

Some months ago I had the opportunity to examine a woman, aged twenty-eight, who died from *croupous pneumonia* on the ninth day. During the last day a herpetic eruption appeared on the chest and abdomen in the form of small blisters of the size of a pin-head. In section the epithelial cells were spread apart by serous fluid and in this fluid as well as in the cells were many Gram-

* Lecture before the Pathological Society of Philadelphia, October 11, 1926

¹ "Gonokok. meningit med gonokok-purpura," *Nord Magazin f. Lægerie*, 1924, p. 809

positive cocci resembling pneumococci. And in the small arteries under the vesicles were large masses of similar cocci either free in the lumen or within endothelial cells. These appearances indicated clearly that invasion of pneumococci led to the formation of the vesicles about which there was little sign of inflammation.

But also in the *smaller* and *middle-sized* arteries you may find real inflammatory changes under different forms

In later years I have had opportunity of investigating several cases of a seldom and peculiar disease about which very little is known—the so-called *periarteritis nodosa*. This disease has its seat in the small arteries and is often very difficult to recognize. It arouses interest partly owing to the peculiar clinical and anatomical picture it presents and partly on account of its obscure etiology. As an example you will allow me to report briefly one of my own observations.

HISTORY OF THE CASE

The patient was thirty two and one half years old, a factory worker. In 1916 he had pleurisy and in 1917 a rather serious blood poisoning with pyarthrosis in several joints, followed by ankylosis. Beside, since the age of sixteen he had suffered from persistent attacks of bronchitis in autumn and winter.

His present illness began rather suddenly in December, 1925, with an attack of pain in the right side of the abdomen, which passed away after ten minutes. It came on again after some days, but now in a different place. The pains at first were burning and stabbing, afterwards aching. The attacks repeatedly recurred, coming on quite suddenly. They had no connection with the meals and were not accompanied by dyspepsia or vomiting. Defecation and passing of urine were in order. He also felt a tenderness at different parts of the abdomen. Some fever was present from the beginning and during the following months. The pains became gradually more severe.

In the beginning of March he had diarrhoea and sometimes dyspepsia. The evacuations were thin, almost watery, and mixed with mucus. At first they were not bloody, but afterwards blood was observed. The fever continued, he had night sweats and became emaciated. The pains and tenderness in the abdomen persisted, but constantly changed their seat.

As he grew no better, the doctor who was treating him had him admitted, on September 4, 1926, to one of the surgical wards in the State Hospital with the doubtful diagnosis of appendicitis (?), peritonitis (?). On examination of the abdomen tenderness to pressure was observed everywhere, enlarged liver, no œdema. The urine was normal, there was a little blood in the evacuations. His condition became steadily worse, the fever rose to 39° and he died on the 13th of April. No definite diagnosis could be made. A pyæmia had been suggested, likewise a tuberculous affection of the intestines. There was found no reason for subjecting him to an operation.

The *post mortem* examination revealed three changes that at once struck

the eye. The *kidneys* were large. Their surface extremely irregular, showing in parts numerous yellowish white necrotic areas, some of which were hemorrhagic, in parts some scar like puckerings of unequal size and very irregularly distributed. No distinct infarcts were found. Most of the above mentioned foci were in the cortex, whilst the medulla was healthy. On the cut surface were seen on close inspection some small, grayish white, thickened blood vessels with nodules or short strings, which were more easily felt than seen. Some of these vessels were thrombosed. The renal arteries proved to be normal (Fig 1)

The *right ureter* was transformed into a calcified rigid tube for a distance of a couple of centimetres at a point about 15 centimetres above the bladder

The second and really most striking discovery was made in the *intestines*. The whole of the small intestine was redly injected, although unevenly, the injection being most marked in the mucous membrane. Throughout the whole of the small intestine were seen remains of ulcers or scars therefrom, as well as some actual small ulcers, which were very irregular in form, size and distribution. Between these ulcers there were hyperæmia and hemorrhagic infiltration, but no actual inflammation. The ulcers were clean, without incrustation. The blood vessels in the intestine and in the mesentery were highly hyperæmic, but not conspicuously altered.

A third organ which also showed changes was the *liver*. This organ was enlarged. On its surface were seen irregularly distributed areas, some of them anæmic, some hyperæmic, and corresponding thereto were found in the substance of the liver greatly thickened, grayish white, rigid vessels, in parts thrombosed, presumably branches either of the vena porta or of the arteria hepatica, the main portions of which vessels were normal (Fig 2)

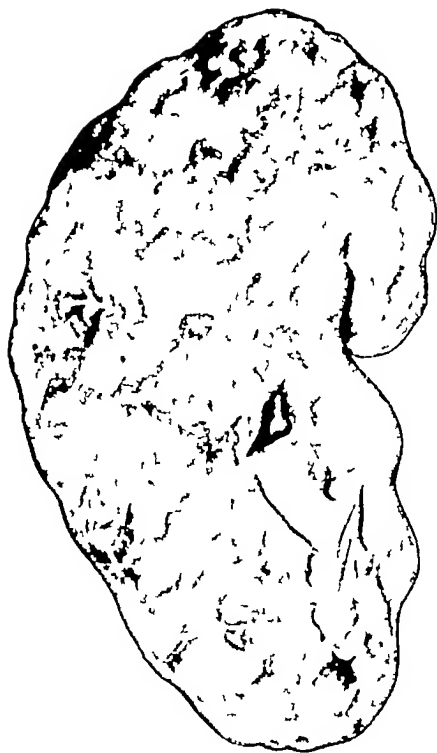
Apart from a slightly *enlarged heart* (430 gr), no pathological changes were otherwise observed in the organs.

After the post mortem the diagnosis seemed to me extremely obscure. There existed, it is true, a kind of ulcerating and necrotic enteritis, which, however, from its appearance did not correspond to any known type. The changes in the blood vessels were, however, the most striking features, and on thinking further over the case it occurred to me that it might be an example of periarteritis nodosa. I therefore again examined the organs, especially the heart, and soon found very minute nodules on the small branches of the coronary arteries. They were almost invisible, but could easily be felt.

The *microscopic examination* at once made the matter clear and showed that there really existed a case of this disease. In a section through the *intestines* it was found that a small artery in the submucous tissue was greatly swollen and completely obliterated, owing to extensive proliferation of the cells of the intima with exfoliation of the endothelium. The inner layers of the media were little changed, whereas the outer layers of the media, especially the adventitia, showed great alterations, being swollen and infiltrated with cells, and this infiltration also extended without sharp limits to the adjacent submucosa and the veins situated therein, the walls of which were likewise inflamed, although to a much smaller degree than in the arteries. All the veins for a long distance over the *intestinal wall* were greatly distended, and in conjunction therewith there was also a hemorrhagic infiltration in the whole of the mucous membrane as well as necrosis of the glandular epithelium.

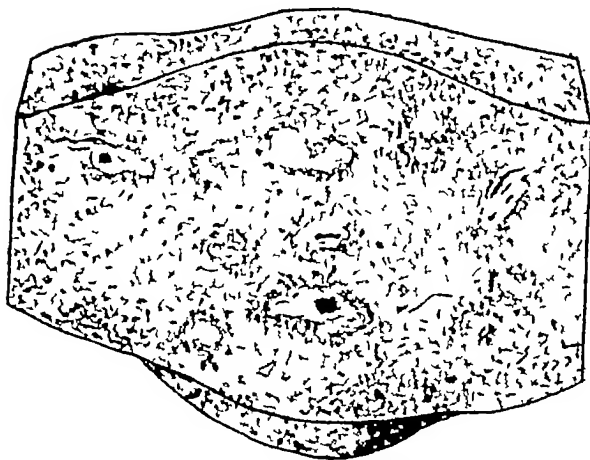
In preparations from the *mesentery* immediately outside the intestine a small

FIG 1



Kidney, showing periarteritis nodosa

FIG 2



Section throughout the liver showing periarteritis nodosa

FIG 3



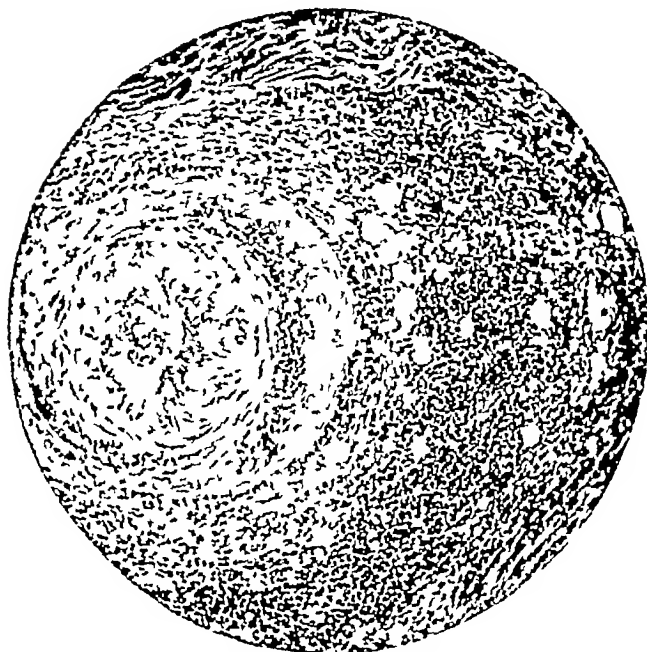
Schematic view section through heart-muscle All arteries show inflammation in and around the wall

FIG 4



Section through an inflamed artery in the cardiac wall low power

FIG 5



Section through an inflamed artery in the cardiac wall (x150)

artery was found to be greatly altered in a limited area, it was swollen and degenerated, with great proliferation of the intima, so that the lumen was filled with endothelial and homogeneous masses resembling connective tissue. There was also degeneration in parts of the media and extensive proliferation and cellular infiltration of the adventitia.

In the *heart*, corresponding to the minute, almost imperceptible nodules on the small arteries, just under the sulcus transversus, were found, particularly in the right ventricle, distinct and very characteristic changes in the arteries. An extensive and pronounced periadventitial cellular infiltration extending to the adventitia and media, while leaving the intima intact. Afterwards there was seen a narrowing of some arteries, but the lesion was not very pronounced and was comparatively new. The cellular infiltrations consisted of lymphocytes, plasma cells and eosinophile cells in large numbers, also some polynuclear leukocytes. Hemorrhages and pigment around the most severely affected parts, but as yet no necrosis in the myocardium. There were no changes in the arteries of the spleen, lungs, or brain. (Figs 3-5)

From these results of the microscopic examination the diagnosis was clear. There existed a typical case of *periarteritis nodosa* of about four months' duration, with its principal localization in the intestinal canal and in the kidneys and liver. Also the cardiac arteries were attacked, but here the disease was in the commencing stage and had not as yet effected changes in the musculature or produced clinical symptoms. (Figs 1-5)

The case thus represents chiefly the "intestinal type" and partly the "renal type" of this singular disease, which can have so many varying localizations with consequent variations in the clinical pictures.

There have now been recognized and described about 100 cases from all countries—very few in the United States, so far as I am aware—and fresh cases are constantly being added to the list, now that interest in the disease has been awakened and the features of the anatomical picture have become generally known.²

Another case which I described in 1922³ represented what is perhaps the most frequently occurring form of the disease—"the nerve and muscle type," with, moreover, simultaneous changes in the heart and kidneys.

In addition to these three types—the intestinal type, the renal

² Baló (from Hungary) already even speaks of "an accumulation of cases of periarteritis nodosa, etc.," (3 cases) *Virch Arch*, vol 259, 1926

³ "Unknown Forms of Arteritis, with Special Reference to Their Relation to Syphilitic Arteritis and Periarteritis Nodosa," *Am J Med Sci*, vol. 163, Feb, 1922 (Case VII)

type and the nerve and muscle type—we can besides distinguish also a “cardiac type” with its principal symptoms of cardiac origin. The question whether we are justified in establishing yet a fifth form of the disease, “the cerebral type,” I shall revert to later on. Also the *cutaneous system* may be severely and primarily affected—multiple hemorrhages, purpura or multiple polymorphous erythema of the skin (purpura and necrotic foci).⁴ The diagnosis has therefore sometimes been made after examination of nodules excised from the skin.

The disease attacks people of all ages, but most commonly between thirty and forty years, although it has been observed in old people of sixty or seventy and in young persons and children aged, respectively, fifteen, fourteen, eleven and ten years, and indeed also in small children of two and one-half years and even in a baby aged nine months (Thinness).

The disease often begins acutely, indeed quite suddenly, with fever, pains of different kinds and at various places, swelling of the spleen and of the lymphatic glands, now and then skin eruptions of varying nature (nodules with diseased vessels can then be detected in the skin), as well as leukocytosis. A greatly increased pulse-frequency is a prominent feature. A persistent, very irregular and often not very pronounced fever usually accompanies the disease, the duration of which moreover varies very greatly, being in most cases only seven or eight weeks, but not infrequently three, four or six months, while cases with a duration of eight or nine months, and even from one to one and one-half years, have now been observed and described. Traces of vascular lesions in process of healing then become constantly more evident, while it is not at all out of the question that many cases of milder nature and with limited localization may become cured of their own accord (eventually leaving behind defects in the organs attacked). The disease is usually accompanied by a rather severe and conspicuous marasmus and anæmia.

Hitherto few cases have been recognized clinically. But it is asserted from clinical quarters (Kopp⁵) that a probability-diag-

⁴Gloor “Kurze neue Beitr. und Bemerkungen zur Periarteritis nodosa,” *Centr. Blatt f. allg. Path. und Anat.*, vol. 37, 1926, p. 337.

⁵*Deutsche med. Woch.*, 1923, No. 39, p. 1240. The post mortem discovery is described by Lemke in *Virch. Arch.*, vol. 245, 1923.

nosis is possible in certain cases, namely, when we have a certain definite symptom-complex, such as P S Meyer and Brinckmann have recently outlined, namely, a "chlorotic marasmus," together with signs of polyneuritis and polymyositis and symptoms from the alimentary canal and kidneys

In Kopp's case this complex was found in a women aged sixty years. The existence of periarteritis nodosa was suspected, nodules in the skin were sought for and found and on excision of these nodules the diagnosis was confirmed.

In a number of other suspected cases the diagnosis was likewise verified by examination of nodules in the skin. In others again the diagnosis was confirmed by performance of laparotomy and excision of suspicious nodules in the mesentery or intestine, or else after nephrectomy or cholecystectomy.

The Kopp-Lemke case is, moreover, remarkable in another respect. The patient steadily improved after some months' illness, but fully one year after the beginning of the illness she died of apoplexia cerebri, without the changes characteristic of periarteritis nodosa being observed in the cerebral arteries. It seemed as if the disease in this case had become cured. A small number of other "cured" cases have already been described and it may well be that more instances of recovery of mild and abortive forms will be recognized as the disease becomes better known.

In most cases, however, the diagnosis cannot be made until after a post-mortem examination, when the swollen and diseased state of the affected vessels in the mesentery, in the intestines or in the heart at once reveal the nature of the lesion (as, for example, in our case from 1922). But a constantly increasing number of cases are now becoming known in which a diagnosis can be arrived at only by microscopic examination of the diseased organs, since the macroscopic changes are so little in evidence or so well concealed and difficult to understand (as in our present case) that only the microscope can make the matter clear and certain.⁶

It may with certainty be assumed that numerous cases have not

⁶As, for instance, in two cases recently described by Wohlwill "Über die nur mikroskopisch erkennbare Form der Periarteritis nodosa," *Virch Arch*, vol 246, 1923

been recognized, either clinically or anatomically, and that the disease is perhaps by no means of rare occurrence.

I have particular reasons for advancing this opinion. For several years I have occupied myself with arterial diseases, which I think have been given far too little attention in pathology. And in the year 1922 I published an article (*l c*) on unknown forms of arteritis, with special reference to their relation to "syphilitic arteritis and periarteritis nodosa." In this work several observations were reported, including (Cases 3 and 4) two cerebral lesions which proved to be occasioned by very peculiar arterial diseases, which I had not myself observed before or seen described from other quarters (in a woman aged twenty-six, ill for nine months, or two years, and in a man aged forty-six, ill for about half a year). I exhaustively discussed the nature of these lesions, also keeping especially in view the question of syphilis and periarteritis nodosa. Partly on account of the peculiar appearance of the vascular lesion, partly owing to the fact that instances of the last-named disease having its seat in the cerebral arteries (which had seemed to be almost insusceptible to this affection) were practically unknown, I came to the conclusion that I could not positively assert that there here existed a form of syphilitic arteritis or periarteritis nodosa, although I could not venture to exclude the possibility of such being the case. Since this publication, however, there have come in a large number of reports which show that the cerebral arteries are by no means "immune," but on the contrary, as might reasonably be supposed, are also attacked simultaneously with small arteries in other organs. In addition to older records on this point, for example, from Chovostek and Weichselbaum and P. Muller, we have other cases described by Longscope, Dickson⁷ (in a boy aged fourteen and one-half years), Abramow,⁸ Lupke,⁹ Baehr¹⁰ (only microscopically demonstrable), Wohlwill¹¹ and Balo¹².

When we study these cases with cerebral lesions we find to some

⁷ "Polyarteritis acuta nodosa and Periarteritis nodosa," *Jour Path*, vol 12, 1908, p 31

⁸ *Ziegler's Beitr z Path Anat*, vol. 48, Case 2

⁹ *Verhandl d Deutsch Path Gesell*, vol 10, 1906

¹⁰ *Proc N Y Path Soc*, Oct. Dec., 1919, p 131

¹¹ *L c*, 1923, his Case 2, only detected microscopically

¹² *L c*, 1925, his Cases 1 and 2, as well as some others less certain

extent a considerable similarity with our two cases from 1921, although there are also some differences, especially in so far as there were found in our two cases from 1922 numerous giant-cells in the affected arteries, which differentiates our cases from the others observed. On renewed examination of my observations from 1922 I am now inclined to suppose that they really were cases of periarteritis nodosa with localization in the cerebral arteries. Unfortunately the post-mortems in these cases were incomplete.

Anyway it is clear that the cerebral arteries can be attacked and that not seldom, and this will of course occasion such important changes and such serious symptoms in the brain that we are fully justified in setting up also a "cerebral type" of the disease. This is what I now wish to emphasize.

Further I wish to add that the symptoms so often ascribed to the peripheral nerves and muscles indicate that the localization of the disease (the vascular lesion) is certainly very often in the immediate surroundings of the muscles and nerves (*Cf* my case from 1917). And on the whole I assume that this provides the most reasonable explanation of the frequently very pronounced symptoms above described. It is hardly likely that we have here merely a remote effect, as has been supposed.

As regards the *point of attack* of the disease, our present experiences point decidedly to the conclusion that it is the outer layers of the arteries that are primarily attacked with signs of severe inflammation, also extending to the periarterial tissue, and that in addition thereto there are found signs of necrosis and degeneration, especially in the media, together with an—undoubtedly secondary—proliferation of the intima. This latter change seems to be most pronounced in the minute arteries which lack the vasa vasorum, whilst the first-named changes are prominent, or indeed quite dominating, in the medium-sized arteries.

The cellular infiltration assumes different forms according as the microscopic examination is made in the acute stage or in a subacute or chronic (healed) stage of the disease. In the first-named case we find an infiltration consisting of mononuclear cells (including numerous plasma-cells) as well as some polynuclear leukocytes. Giant-cells are as a rule not found, but they may occur, and if our above-mentioned two cerebral cases are really examples of periarte-

ritis nodosa, formation of giant-cells may even be a prominent feature in the whole microscopical picture

On the other hand, if the case is of somewhat older date, the phenomena of inflammation very soon disappear (and this seems precisely to be a prominent feature of the anatomical picture in periarteritis nodosa) and healing processes with shrivelling and cicatrization rapidly become very pronounced. These processes will reveal themselves in the arteries as thickened rings or belts with narrowed lumen, or even with complete obliteration, and answering thereto we will find defects, infarcts or scars, in the corresponding organs. It is an open question whether many cases of periarteritis nodosa may not be regarded as circumscribed lesions which only affect the arteries in a single or in some few organs and which quickly run their course with rapid transition to cure and formation of scars. In other words, it may be possible that some of the cases where we find a healed arterial lesion are in reality the remains of a localized periarteritis nodosa which has healed up spontaneously, while leaving behind certain defects. There is much that speaks in favor of the correctness of this view, and it must be left to the future to decide whether this is really the case.

From an *etiological point of view* I must maintain, in accordance with what I asserted in 1922, that the disease is due to an *acute inflammation* in the arteries and that this inflammation is of an *infectious* nature. The whole anatomical picture in the acute cases and in the newly formed nodules speaks strongly in favor of this view, as also the clinical picture (the acute beginning, the fever, the swelling of the spleen, etc.) Most authorities are now no doubt in agreement on this point.

But as to the *nature* of this inflammation there continues to be disagreement. It is still asserted in some quarters that the disease is directly or indirectly connected with *syphilis*. This view has, however, steadily lost ground. Partly because the affection of the arteries in periarteritis nodosa differs from the usual picture found in syphilitic arteritis, *inter alia*, by the fact that the larger arteries are generally spared, and partly because the Wassermann test as a rule proves to be negative in periarteritis nodosa, while we do not find any spirochaetes. I must also, now as in 1917, fully adhere to this view.

On the other hand, it is still maintained in many quarters, and

with especial energy by the German author, Prof Georg Gruber, who has subjected this disease to a particularly exhaustive study, that periarteritis nodosa is not any specific disease, but merely a resultant condition, a local supersensitiveness, arising out of some previously contracted infectious disease, such as scarlatina, angina, influenza, sepsis (especially when due to streptococci), etc. & Gruber's hypothesis is to the effect that a preceding infection, for example, with streptococci, would occasion an increased inflammatory reaction in the cells of the vessels, so that a slight renewed influence of chronic infectious-toxic nature would produce changes in the arteries such as we find in periarteritis nodosa. There would thus arise a local allergic condition in the arteries, finding expression in the formation of nodules, and this would be no specific condition but would be due to various kinds of virus. In other words, periarteritis nodosa is not a nosologic entity.

The whole line of reasoning seems to be rather artificial and not very probable. *A priori* it might at once be objected that by microscopical examination of the organs in countless cases of septic condition there have not been found and are not being found such changes in the arteries as are observed in periarteritis nodosa.

The available material in my opinion speaks in favor of the view that we have here a *peculiar specific infectious disease* with its seat first and foremost in the arteries. But the cause, the specific virus, is as yet completely unknown. All attempts to find microbes in the inflamed vessels have yielded negative results, even when the material at disposal was quite recently obtained from acute cases and was examined both for bacteria and for spirochaetes and protozoa. It is reported from America (Harris and Friedrichs¹³), that by inoculation of fresh material in a particular manner the same arterial disease has been produced in animals. (The virus was invisible, passed through a Berkefeld filter.) But this has not been confirmed by others, and rabbits frequently show arterial changes.

Another American (Baehr, *loc*) also took fresh material from a case detected by laparotomy and inoculated animals with portions of nodules, tonsils and blood from the patient and with the same

¹³ "The Experimental Production of Periarteritis nodosa in the Rabbit, with a Consideration of the Specific Causal Excitant," *Jour Experim Med*, vol 36, 1922

material made aerobic and anaerobic cultures, but always with negative result. He also employed Noguchi's method for cultivation of spirochaetes and filtratable virus, but likewise without avail.

Several things would seem to indicate that the supposed virus is not a bacterium, but an *animal parasite*, a protozoon. For this speaks the resemblance between the arterial disease in periarteritis nodosa and the affection of the vessels in exanthematic typhus, where there is reason to suppose that an animal parasite is the cause.

The same applies also to another protozoic disease, "Rocky Mountain Spotted Fever"—excellently described in the United States—which also showed a pronounced *angiotropism*, *i e*, preferably attacks the small arteries and in somewhat the same manner as periarteritis nodosa.¹⁴ This is, however, for the present merely a surmise, but the resemblance to the above-mentioned diseases invites us to devote investigation to this point and to suggest the possibility of transmission of infection by means of insects also in the case of periarteritis nodosa.

In periarteritis nodosa it is preeminently the small and medium-sized arteries that are attacked. Meanwhile we also meet in the large arteries, including the aorta, with inflammation of another infectious, although unknown, nature and sometimes presenting a peculiar picture. A case of this kind I desire here to describe in all brevity. The case has recently been fully reported in the *Journal of Pathology* (Vol I, No 4).

A woman, aged thirty seven years, had attacks of vertigo, debility and lassitude, together with pains in the arms and legs. The radial pulse gradually became very feeble, sometimes almost impalpable. There likewise developed in the course of one and one-half years an increasing, somewhat *asymmetrical*, *atrophy of the face and eyes* with increasing loss of the sight. She died suddenly of softening of the brain.

On *post-mortem examination* there was found an aortitis in the aorta *thoracica descendens et abdominalis*, the wall of which was rigid, finely wrinkled and in parts calcified, but without scars and without aneurisms. Microscopically there was found an extensive inflammation, especially in the adventitia and in the outer layer of the media. The most important discovery—the cause of the remarkable atrophy of the face and of the eyes—was a similar inflammation extending to the arteritis anonyma, arteritis subclavia and symmetrical in the *carotis communis* on both sides as well as in the *arteritis vertebralis decutra*, accompanied by a total thrombosis in these vessels. The arteritis vertebralis *sin* was narrowed. The only blood supply to the head, brain and eyes came

¹⁴ Wolbach *Jour Med Research*, vol 41, Nov, 1919

from this artery. Microscopically there was found also in these arteries an extensive inflammation, especially in the adventitia and muscularis, as well as organized thrombi in the same vessels, which thrombi actually contained newly formed, thick walled blood vessels.

An infectious arteritis, but of what kind? There were no microbes, no data for the assumption of syphilis (the anatomical picture was dissimilar, Wassermann's test negative and no spirochaetes could be detected), no similarity with the so-called "endarteritis obliterans" or productiva, in which, moreover, there does not seem to exist any inflammation. Therefore we must suppose an arteritis, doubtless infectious, but of unknown nature.

There are descriptions of arteritis in various infectious diseases, sometimes with microbes present in the walls of the arteries, notably in typhoid fever, in scarlet fever, in puerperal infections, in *pneumonia*, in acute *rheumatic fever* (with Aschoff's bodies) as well as in other infections. Of great interest also are cases of arteritis in the aorta following influenza with inflammation and peculiar scars and necrosis in the media and sclerosis in the intima, perhaps caused by secondary infection with streptococci.

Something similar may have occurred in the case I have described.

In itself it is also reasonable to think that every infective virus that enters into the organism and into the circulation will establish itself and produce inflammation not only in the valves of the heart, a thing which we have long known to be very common, but also in the intima of the capillaries and arteries or through the vasa vasorum in the outer layer of the arteries. Such we can *a priori* assume to be the case, and so it is, only we have been too little observant of this fact in pathology.

In recent years there have appeared with constantly greater frequency accounts of various microbic discoveries in the endothelial cells of the capillaries and precapillaries in a large number of infectious diseases and reactive inflammatory changes in conjunction therewith. On the other hand, less attention has been devoted to cases of actual arteritis in the small and larger arteries.

The purpose of this paper has been to point out that infectious forms of arteritis (apart from the well-known syphilitic arteritis) are by no means rare, but are perhaps of more frequent occurrence than has been supposed. They should be studied more closely anatomically, etiologically, and clinically.

MALIGNANT ENDOCARDITIS WITH SLOW EVOLUTION*

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MALIGNANT endocarditis with a slow evolution, or *endocarditis lenta*, has been especially studied by the late Professor Osler who, in 1908, published a paper based on ten personal cases. Osler insists especially on the cutaneous lesions met with in this morbid process. The numerous cases of this affection reported during the last ten years have confirmed the existence of a clinical form of endocarditis *lenta*, yet this affection apparently is not sufficiently recognized and its diagnosis is often unsuspected. Hence it may not be out of place to report the following case and to make some remarks on the diagnosis and treatment of this interesting disease.

CASE 416—Male, *æ*t thirty-one years. Admitted March 18, 1925.

Hereditary Antecedents—Father died from an accident at the age of seventy-two years, had never been ill. Mother is alive and well. Three brothers and a sister in excellent health.

Personal Antecedents—No diseases of childhood. At the age of ten was treated for myopia. At present this is very pronounced, although there are no lesions of the choroid or retina.

Present Illness—About the beginning of 1925, the patient began to suffer from sharp pain between the scapulæ. Shortly afterwards the pain became localized at the waist and occurred in paroxysms, especially at night. A physician consulted at this time made a diagnosis of phrenitis as he could detect nothing abnormal in the respiratory or circulatory system. After two days in bed and sodium salicylate *per os* these symptoms disappeared. Soon afterwards mild pain in the joints developed and the patient felt slightly feverish in the evening. This state of affairs remained stationary until the middle of March, when very severe nocturnal sweating ensued. Patient complained of feeling cold during the day, appetite remained good and he was able to continue his occupations. At the end of March the sweating became more severe and the evening temperature ranged around 102° F. He then was admitted to Professor Roch's service.

Status Præsens—Man of average height, muscles well developed, general nutrition good, face rather pale.

Circulatory System—The apex of heart beats in the fifth space in the nipple line, shock well defined, no thrill, no vibrations. The areas of relative and absolute dulness do not extend beyond the normal limits.

Auscultation—A mild systolic souffle at the apex, extending to the left

* From the Medical Clinic of the University of Geneva, service of Professor Roch.

axilla, commencement of presystolic rolling sound Weak systolic souffle in the right second intercostal space extending to the vessels of the neck. An intense diastolic souffle, most marked in the left third intercostal space near the sternum and extending toward the abdomen along the left side of the sternum, which is still perceptible in the midline in the epigastric region.

The radial arteries are soft and straight Pulse regular and bounding, 100 to the minute Musset's sign slightly positive No other peripheral signs of aortic insufficiency Maximum, 14 6, minimum, 5

Respiratory System—Voice clear Respiration easy, ample and regular, even when lying down Thorax symmetrical, respiratory ampliation good.

Lungs—Sonority, vocal vibrations and vascular murmur offer nothing abnormal No superadded sounds

Digestive System—Appetite poor Digestion easy Stools regular Tongue moist Good dentition Deglutition easy Abdomen flat, walls supple

Liver—Upper limits in the fifth right intercostal space Lower limits do not extend below the false ribs Spleen could not be palpated.

Urogenital System—Micturition easy, no nycturia No evidence of former venereal affections Urine Albumin, blood, sugar, urobilin and deposit absent

Nervous System—Sensibility and motility preserved Reflexes Tendon +, cutaneous +, Babinski 0 Pupils equal, regular, round, reacting well to light and accommodation.

March 25th—Professor Roch's notes Apex beats in the left fifth intercostal space, presystolic rolling with a slight short systolic souffle followed by a soft diastolic souffle. At the base a soft systolic souffle extending towards the vessels of the neck. Diastolic souffle extending downwards along the left side of the sternum

April 2d—A very distinct Duroziez's double crural souffle Nocturnal insomnia Fleeting pain in knees and shoulders

April 16th—The souffle of aortic insufficiency has become much more intense.

April 22d—Rolling sound at the apex, indicating a mitral stenosis The other cardiac signs persist without any change

April 30th—Heart's action rapid The diastolic souffle extends to the entire cardiac area with its maximum in the left fourth intercostal space.

May 3d—Blood-culture *Streptococcus viridans* in pure culture

May 10th—General condition mediocre, insomnia, slight dyspnoea Blood pressure with Vaquez Laubry instrument Maximum, 14, minimum, 4

May 15th—Appearance on skin of trunk, especially over the anterior aspect, of small reddish papules the size of a pin's head, painless and not becoming effaced by pressure made upon them. Another crop developed four days later

May 30th—Blood-culture Pure culture of *Streptococcus viridans* Urine Albumin 1 per cent, some red corpuscles and very few granular casts

June 6th—Towards evening the patient complained of some tingling and numbness in the left hand. Slight decrease of strength in left arm, especially the hand. On the following morning there was a left sided hemiplegia with complete functional impotency of left arm and a state of hypertonia of the left lower limb with foot clonus Babinski + on left side Speech fairly well preserved, slight motor aphasia, no sensory aphasia, some slight obnubilation Professor Roch's diagnosis was embolus of the right sylvian artery—with a bad prognosis

in as much as a purulent softening of the focus was to be feared. At 6 P.M. a left limp hemiparalysis developed without sensitive disturbances. Death ensued the following morning.

The temperature chart in this case is deserving of notice. It was extremely irregular, offering very great oscillations. During the first three days the temperature varied between 101° and 102° F. The three following days it remained at 98.6° and even below, only to reach 101.2° at the end of six days a drop to normal occurred and this lasted for eighteen days although interrupted by a temperature ranging between 102° to 104° for six days, which resulted from an injection of casein.

As to treatment, proteinotherapy was essayed in the form of an intramuscular injection of ten centigrams of casein and several intravenous injections of trypanflavin in doses of twenty five milligrams to twenty centigrams. As to symptomatic treatment, it consisted of cardiac stimulants, and analgesics.

The clinical diagnosis was Malignant endocarditis due to *Streptococcus viridans*, polyorificial cardiac lesions, multiple emboli—kidneys, spleen and right sylvian artery.

Anatomical Diagnosis (Professor Askanazy)—Ulcerating endocarditis, with perforation, of the aortic valves. Old endocarditis of the mitral valve with recent small thrombotic deposits on its posterior aspect and tendons. Hypertrophy and dilatation of the left heart.

Spleen Old white infarct, multiple white infarcts, soft tumefaction.

Kidneys Advanced hemorrhagic glomerulonephritis. Old white infarct.

Liver Enlarged hyperæmic liver with beginning central necrosis of the acini.

Stomach Catarrh from stasis.

Nervous system Embolus in right sylvian artery, commencing softening in the right hemisphere, especially the central nuclei.

CLINICAL REMARKS

Endocarditis lenta is not uncommon as many cases have been reported from various countries. It is unquestionably less frequently met with than acute malignant endocarditis. In Lenhartz's statistics of thirty-eight cases of malignant endocarditis sixteen were of slow evolution (42 per cent.). Norder's statistics are the most important, of one hundred and fifty cases of malignant endocarditis there were eighteen instances (12 per cent.) of the lenta type.

Endocarditis lenta is more prevalent between the ages of fifteen and thirty years, in 66 per cent. of the cases according to R. Debré's statistics, although this observer met with a case in a male, at forty-seven, and Osler records two instances in patients aged fifty-two and fifty-three years, respectively. On the other hand, Gorwitz has recorded a case in a child.

As to sex, this morbid process, according to Debré, is more frequent in the female. Norder finds the sexes in equal proportion,

while in the thirty-one instances published by Astra Calugareanu there are seven women and twenty-four men

The general state of health, infectious antecedents and above all old cicatricial lesions of the endocardium—usually the result of rheumatism—are extremely important etiological factors, as in the case of any infection, organic debility is a predisposing factor, but this affection is more prone to develop on an old chronic endocarditis, although not in all cases. Endocarditis lenta has been met with in healthy subjects with a normal heart without any infectious antecedents and presenting an excellent state of health. The case here recorded is an example

The pathogenic agent is above all Schottmuller's *Streptococcus viridans*, although other bacteria, such as the pneumococcus, staphylococcus and meningococcus have been found in a certain number of cases (Latour). On the other hand, blood-cultures are not infrequently negative. Jugmann found it negative in 6 per cent. and Astra Calugareanu in 30 per cent. of the cases

Given the ubiquity of the streptococcus the various lesions of the mucosa of the throat favor the penetration of this pathogenic agent into the general circulation. In the female, infection of the genitalia plays the same part and de Massary has reported a case of endocarditis lenta following an infection of the biliary tract.

Endocarditis lenta has a clinically silent onset, hence the difficulty in exactly estimating the length of its evolution. The first manifestations are changes of the general health. The patient complains of general weakness quite out of proportion with his activities. At the same time he feels feverish and frequently complains of a feeling of cold and chilliness and if the temperature be taken it will be found to register 100.5° or more. As things progress the patient becomes pale or the skin may take on a special *café au lait* color mentioned by Lipman. In some cases mild and fleeting rheumatoid pain may occur, rapidly changing its localization, and is the first forerunner of a serious morbid process in preparation and unsuspected at the time. Less frequently the onset of the disease announces itself at once by cardiac disturbances. In one of Debré's patients attention was first attracted by subjective disturbances of cardiac insufficiency and examination revealed all the classical signs of aortic insufficiency.

The initial phase of the affection may last for weeks or months

without obliging the patient to take to his bed. In some subjects the initial phase is interrupted by a complete remission. The temperature, which is never continued, assumes the remittent or intermittent type and therefore is an intimation that all other symptoms may subside temporarily, but this period of calm generally does not last for any length of time. The temperature returns, likewise the asthenia and pallor of the skin, accompanied or not by a more or less high-grade anæmia, all these symptoms continue to increase and the patient presents the characteristic aspect of a serious disease which has reached the phase of full development. Other symptoms next appear which are sufficiently characteristic for the practitioner to make an exact diagnosis.

Cardiovascular Manifestations—The functional disturbances are usually fleeting and not marked, occurring in phases traversed by periods of complete quiet. The patient complains of exertion dyspnoea, very distressing palpitations and occasionally precordial pain, paroxysms of asthma and angina pectoris have also been noticed. Since most of the patients are the possessors of old cardiac lesions it is often difficult to surmise to what extent the symptoms are due to the superadded endocarditis. This also applies to the signs found by objective examination. The abnormal cardiac sounds found at the onset of the disease are more apt to be due to former valvular lesions. As to the official localizations, the patients are for the most part mitro-aortics, next come the mitrals and pure aortics. In Astra Calugareann's statistics of thirty-one cases there are fourteen mitro-aortics, eight aortics, six mitrals and two pulmonaries.

The question of the precision of cardiac auscultation signs is subject to discussion. Formerly, the variability of the souffles was regarded as an important diagnostic sign of endocarditis lenta. In reality, they are rather fixed and if they undergo changes during the evolution of the process, these changes are trifling. In the case reported, the patient was in the hospital for nearly three months and the physical signs hardly changed.

Tachycardia is an important symptom which sooner or later develops in the evolution of the disease. The pulse-rate generally is not related to the temperature.

The blood-pressure is related to the condition of the cardiac functional state and the nature of the predominating lesions.

The *respiratory system* usually remains intact in endocarditis lenta. Occasionally there are phenomena of stasis, signs of bronchitis, pulmonary congestion and œdema, but hemorrhagic infarct is far more common. Pulmonary embolus is rather uncommon because the vegetation almost always develops in the left heart, rarely in the right.

The *digestive system* always presents more or less pronounced anomalies, such as anorexia, nausea, vomiting, severe constipation with or without melæna. Very frequently the patient complains of abdominal pain due to arterial embolus, which in some cases is extremely severe.

The liver is often increased in size and may be the seat of infarcts giving rise to sharp pain which can be mistaken for cholecystitis. Splenomegalia is practically always present. It is an early and very important symptom of endocarditis lenta.

The Urogenital System —The kidneys are always involved. The lesion is either a subacute hemorrhagic nephritis with moderate albuminuria, casts and red blood-corpuscles, or else an infarct from an arterial embolus.

The *nervous system* rarely remains intact. According to Debré, more than 50 per cent. of the cases of endocarditis lenta die from cerebral hemorrhage or softening. The latter is the result of an embolus and, as in the case here reported, usually occurs in the sylvian artery. According to the localization and importance of the area involved, epileptiform disturbances, abnormalities of sight or hearing and more or less serious paralytic symptoms are observed. Cerebral hemorrhage is usually the result of rupture of a latent arterial aneurism, generally followed by lethal coma.

Cutaneous Manifestations —Purpuric eruptions and particularly Osler's painful erythematous nodes are to be mentioned. Purpura is a banal phenomenon in acute septicæmias, in the form of rather large patches. In endocarditis lenta it usually appears in the form of small spots.

Osler's nodes are more important. They are small nodosities having a diameter of about one centimetre and a half, erythematous and painful and usually seated in the pulp of the fingers and toes. They are also met with on the forearm, abdomen and palpebral region. Several usually appear at the same time and soon disappear only

to recur Their appearance is preceded by a tingling sensation and local heat. Osler's nodes were supposed to be a pathognomonic sign of endocarditis lenta, but recent studies show that this is far from the case They were absent in all of the thirty-one cases reported by Astra Calugareann and in the case here recorded

The *hippocratic fingers* were noted in 71 per cent. of Astra Calugareann's patients

General Phenomena.—The remittent or intermittent type of fever of the initial phase of the disease continues and retains these characters in the period of full development. During the periods of remission the temperature may drop to normal and then suddenly goes up to 102° to 104° In the majority of cases during the febrile attacks it ranges around 101° to 102° and during the periods of remission it varies from 97° to 98.6° , with quite marked daily oscillations

The blood-count shows a decrease in the number of red cells and hemoglobin and changes in the equilibrium of the leukocytes In a case reported by Achard-Foix the red cell-count was 1,800,000, Astra Calugareann found 1,200,000 in one case and 900,000 in another As to the white cell-count leukocytosis and leukopenia have been reported The leukocytic count in a number of cases has shown a tendency to lymphocytosis.

The general health remains relatively satisfactory regardless of the gravity of the disease, it changes rapidly with the periods of remission and aggravation, but in the terminal phase of the affection cachexia ensues

The prolonged evolution is the essential character of this special type of malignant infectious endocarditis Latour's statistics based on forty-eight cases show that the average duration is seven to eight months In the case reported it was nearly five and a half months, while in Rapin's case the evolution was only eleven weeks Huchard has published a case with an evolution of nineteen months These long evolutions may be interrupted by quite long remissions, Stern and Hercher observed a complete remission lasting six weeks, but in the generality of cases the phases of aggravation and remission succeed each other in quick succession.

The *prognosis* of endocarditis lenta is practically fatal Nem-

sted's patient recovered after treatment with a serum and vaccine prepared from the streptococcus isolated from the patient's blood. When seen two years later she was in perfect health. This is the only recovery with which we are acquainted. Death is usually due to cerebral embolus or hemorrhage but an embolus may occur in an abdominal vessel producing intestinal necrosis and fatal peritonitis. It may occur in one of the limbs, death from gangrene being the outcome. Death from rupture of an abdominal aneurism has also been recorded in this disease.

Treatment—The present-day therapeutics for endocarditis lenta are powerless. Many experiments have been made with chemical medicaments, vaccines, and serums without obtaining any evident results. It may well be questioned whether the ameliorations obtained and attributed to such or such drug in reality are not coincided with a spontaneous remission of the disease. As to chemical products, sodium salicylate *per os* or in intravenous injections has been a failure, and the same may be said of quinine, urotropin, arsenic, arsenobenzol, mercury, the colloidal metals—especially colloidal silver—and, of late, tryptaflavin.

Vaccinotherapy and serotherapy have, in general, not given any happy results. The former has been carried out with vaccines prepared from cultures obtained from the patient's blood. Serotherapy has been administered with polyvalent streptococcic sera by some, others (Norder, Nemsted) have employed a specific serum derived from horses immunized against the streptococcus isolated from the patient's blood and Nemsted's patient recovered by this treatment.

OBJECTIVE MEDICINE *

By CHARLES GREENE CUMSTON, M D

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ALTHOUGH medicine appears to have attained its truly scientific or objective phase, we must not infer that in bygone days periods during which scientific work was done did not exist. Quite on the contrary in all epochs and in nearly all the doctrines and schools of medicine one finds a more or less considerable amount of positive science. But until the commencement of the nineteenth century theological and metaphysical ideas dominated the positive element and prevented it from developing. On account of the great discoveries made and our extended general knowledge, data of a natural kind now are causing theological and metaphysical conceptions everywhere to recede, both of which are states and ways of thinking which historically are not to be condemned, because they represent the necessary phases of the great evolutions of humanity. *It is the decrease of the supernatural and growth of the natural, the decrease of subjective notions and the growth of objective notions.* This law applies to medicine as well as to all the sciences.

Life is not to be found outside of the realm of organization. Hence life can only be regarded as a property of the elements. It is neither a cause nor an effect, neither is it a principle nor a result.

The fifth one of the fundamental sciences, namely, *biology*, studies organized beings and the laws governing their activity. It is the statics of anatomy, the dynamics of physiology and it is either abstract or concrete. Medicine is one of the applications of biology because it studies human beings in the so-called "normal" state. Therefore, it is an art, but this art has constantly progressed hand in hand with the sciences from which it is derived and in turn to whom it furnishes a large number of their component elements. Moreover, medicine is infinitely allied to the fundamental sciences of physics and chemistry.

The progress made in the various fundamental sciences has its

* Being the concluding lecture to the course on medical philosophy in the University of Geneva, delivered March 18, 1926

re-echoing in medicine Reciprocally, medicine unceasingly furnishes data to biological science derived from studies on the organized living being Just as the study of the immediate principles—which leads to the study of tissues and organic fluids of the animal economy—reveals the fact that there is always a bond uniting the elementary properties of organized substance and the fundamental and secondary conditions constituting or determining their fulfilment, so you must recognize that there exists a union between the disturbances of the organic functions and a lesion of the structures fulfilling these functions No longer can we invoke supernatural causes, a nervous fluid, a vital principle or similar imaginative causes, natural laws and immanent properties alone explain the production of, or recovery from, disease

Pathological anatomy cannot be separated from normal anatomy Any medical doctrine which attempts to do this is absolutely false, because a pathologic state cannot be understood if one is ignorant of the changes arising in the organs and their normal state, which must be compared with their pathological state, in order to have a proper understanding of disease Moreover, it is impossible to comprehend the phenomena of life, if one is ignorant of the organized substance which manifests them The physician who does not admit this doctrine is, from uncertainty, led to skepticism, which in turn leads him on to charlatanism.

Pathology is inseparable from both anatomy and physiology, it is an adnexa of these branches of medical science, anatomy studies the organs of the living being in their ordinary state, while physiology studies the functional properties of the organs in the same circumstances Pathology is the study of anatomical changes and the resulting functional perturbations Consequently, we cannot call the pathological state abnormal, because the conditions and influences determining the functional disturbance—in other words, the symptoms—are real

Empiricism should to-day be banished from therapeutics and diseases should no longer be explained subjectively Therapeutics is composed of immediate accidental principles which we resort to with the object of modifying the changed organic structures of the body Now, how does such modification take place? Clearly by a

union of these immediate principles with the substance of the affected anatomical elements. Consequently, it is necessary to know the changes effected in the organized substance by the therapeutic agents and it is not enough to empirically suppose that such and such a substance produces such and such functional effects, you should positively know, understand and analyze the manner of production of the given appreciable state.

The properties of innervation and contractility of the nervous and muscular structures, if they can be modified by immediate principles, on the contrary have no direct effect upon the nutrition of the anatomical elements, that is to say, on assimilation and disassimilation of the immediate principles composing organized substance. Now, as I have said, every medicament is an immediate accidental principle which becomes united with the substance of a given anatomical element according to the immediate composition of the latter. Therefore when you administer a medicament you should be familiar with the changes it will set up in the tissues and their component parts, likewise its manner of absorption and elimination. Briefly put, it is essential to study experimentally the constant physiological action of drugs, before they are employed therapeutically.

The dogmatic consequence that you must draw from what I have said is that the words *excitability*, *irritability* and *irritation* should simply denote particular degrees of sensitive or motor properties of innervation belonging to organized substance, because they cannot express a new state of this substance since it is composed of immediate principles which, consequently, cannot be called its excitants.

I have now put before you some general principles of scientific or objective medicine and I shall now refer to the help the physician may derive from the sciences of chemistry and physics, as well as the procedures of study that he may borrow from other special sciences, as these largely compose the scientific order of things in medicine.

Besides drugs and their reactions on the various organic fluids, chemistry offers various procedures of analysis and dosage which are absolutely necessary for pathological research and clinical medicine. The notions furnished to medicine by chemistry are important to the highest degree, such for example as the composition of the organic

fluids, their changes, the excess of a principle over others, the elimination of poisons or drugs, and a thousand other valuable data

Physics has given medicine the present-day perfected instruments of all kinds, from the compound microscope, which reveals morbid changes in the cells, to a chromatic glass used in ophthalmology, apparatuses for registering physiological acts and pathological changes taking place in organs and tissues, the spectroscope, polarimeter, ophthalmoscope, and the X-rays Objective medicine still requires more enlightenment to be derived from experimental research work which is favorably progressing

The experimental method not only consists of observation, but it can at will reproduce new phenomena for close and deep study, it can decompose a phenomenon into its component elements or reproduce it by combining these elements, by artificially provoking the acts observed within the organism of living beings Applied to medicine, this method gives most precise data and laboratory teaching is now highly developed in all great medical centres of the world

Comparative pathology is linked to experimental medicine, the possibility of inoculating animals with the various diseases common to man and animals—syphilis, tuberculosis, hydrophobia and anthrax, not to mention others—is one of the greatest conquests of experimental pathology This branch of objective medicine has given us the clue to transmission of diseases and their manner of contagion, as well as their exact duration, evolution and various complications. It has also been the means of applying potent medication to man for their prevention and cure For these reasons experimental pathology must be regarded as one of the most important branches of scientific medicine, because the study of specific virulent processes, common or similar in man and animals, reveals the conditions in which they develop in both, as well as artificially producing them in the latter, the final result being a certitude almost as absolute as in chemical or physical experiments.

Pathological physiology is a branch of experimental medicine It comprises data obtainable by experimental work on animals and enlightens pathological processes It also includes the rational study of physiological disturbances resulting from changes arising in organs and tissues in man All this leads to our knowledge of the functions

of diseased organs and at the same time offers us a precise interpretation of symptoms observed in disease.

The so-called "exact" sciences furnish positive medicine with useful data. Thus, statistics in the form of *demography* reveal the mortality in the various ages of man in various climatic, geological, meteorological, seasonal and social conditions. Now, since mortality is the direct result of disease, statistics give us another means of determining how morbid processes are produced and this leads directly to their prophylaxis.

By still further subdivision statistics have become an important element of prophylactic medicine. In the same order of things chronological medicine has revealed the disappearance of certain diseases and the appearance of certain others, all of which data allows us, by comparing certain contemporary morbid phenomena with those of the past, to discover their place of origin.

You now perceive what are the principles and procedures of objective medicine, they not only consist of those general methods which I have roughly exposed, but at the bedside of the patient, in clinical examination, objective medicine should still affirm itself. All procedures of chemical and physical research here find their ultima of usefulness. Unfortunately, we have as yet not attained the time when each and every morbid process can be diagnosed with certainty, but the road lies before you and you have only to follow it.

The objective phase of medicine has now been attained and is to be distinguished by the following characters. Never to accept anything not within the domain of pathological facts, never attempt to look for the primal causes of morbid states—"the why of the why." Keep medicine hand in hand with biology, that is to say, give it the place that it should normally occupy in the order of appearance and in the real linking up of the sciences. To believe in the fundamental importance of the accessory sciences, all of which are the steps leading up to knowledge of the most complex phenomena of life. Give a large place to pathology and physiological pathology and unceasingly compare them with corresponding normal states. Search for the lesion in the cell and experiment with drugs in the healthy organism.

And now to conclude. Medicine is an art based upon several sciences, and is daily becoming more certain and effective. In point

of fact any art or artistic or industrial enterprise is dependent upon encouragement and direction of some particular science, and in the case of medicine this science is biology and several other sciences unjustly called accessory

All progress made in the art of medicine depends upon discoveries made in the five hierarchic sciences. These discoveries have been made by eliminating theological, metaphysical and mystical errors, which for centuries impeded their development, and by special biological discoveries, quite as much as from a general extension of human knowledge

It is a most unfortunate presumption to suppose that practice and theory are antagonistic. *Theory is merely practice explained and practice is simply the theory applied*

The public make a vast mistake in supposing that a *savant*, that is to say a theorist, cannot be as accomplished a physician as he who is content with practising his art without keeping abreast of new discoveries and inventions. The young physician must never feel that he has reached his goal when he has come into possession of his degree of M D, and afterwards merely seek a clientele. He must keep in touch with all that is going on in the progress of the sciences, otherwise he will soon become less rich in the resources of his art than those of his colleagues who have continued to keep in touch with the times. *Because all that is true will be useful in practice and that which is useful can only be that which is true*

The same qualities make a good practitioner and a true *savant*, whether it be at the patient's bedside or in the laboratory, the same faculties are always in operation. The study of the sciences is necessary for the practitioner because they give him an *intellectual education and discipline* with the result that he will act with full knowledge of the cause and the effect—in other words, he will succeed. This is what has been complacently called "sagacity," or professional insight, etc, but in reality successful practice simply depends upon the natural inductions and deductions of a well-informed man, while their practical results are more imputable to science than to the man.

Therefore, no opposition exists between practice and theory, because practice is successful only when theory gives it the laws with

which it is occupied. But practice is, in its turn, scientific when on a given point it can demonstrate the falseness of an established law and so change it. In this case it acts like an experiment by furnishing data to science or to a contemporary theory.

Clinical medicine and diagnosis should ever be objective in their procedures of investigating disease and you must remember that treatment depends upon biological and cosmic acquisitions slowly and and with difficulty gained by generations of learned men. The gross therapeutic empiricism of the early days of medicine is being replaced by the normal, scientific and rational application of remedies. We at present possess the sure means of ascertaining the nature of diseases and of discovering their existence, the means for their positive cure will be discovered in the near future.

Surgery

CLINIC HELD NOVEMBER 5, 1926, AT JOHNS HOPKINS
HOSPITAL

By DEAN LEWIS, M D

Professor of Surgery, Johns Hopkins Hospital, Baltimore

CANCER OF BREAST

THE specimen which I am about to show was removed this morning. The patient had a tumor of the right breast. She observed this some weeks ago while bathing. Before she felt this mass, she had noticed some pain which, however, was slight and to which she paid but little attention. When the breast was palpated the mass seemed fixed in the breast tissues. There were no signs such as accompany an inflammatory lesion. When the skin over the mass was picked up between the thumb and index finger, it wrinkled and seemed to be connected with the mass lying beneath. When the axilla is palpated, enlarged lymph-nodes can be felt beneath the lateral margin of the pectoralis major. Clinically, this was a carcinoma of the breast. A radical removal of the breast was performed this morning, and I wish to demonstrate to you the gross appearance of this tumor. You can then study a section under the microscope so that you can correlate the clinical, macroscopic and microscopic pictures. Look at the cut surface of the lymph-nodes, in which there are definite areas of carcinoma. The tumor in the breast can easily be differentiated from the breast tissues which are invaded at the margins of the growth. The growth at the margins has a contracting or cicatrizing appearance and is harder than the surrounding tissues.

MULTIPLE MYELOMA

This patient has an interesting history. He is forty years of age. His present trouble began in September, 1924, following, as he believes, an operation for hemorrhoids. The relation, however, between the operation and his present condition is indefinite. In March of 1925 symptoms were noted which undoubtedly were caused by the lesion existing at the present time. Pains between the shoulders and down the spine were noted. Dull, aching pains were also observed in the ribs which extended around the chest—they might be called

girdle pains During this time the patient became shorter He noticed this himself, and volunteers the information that he is 3 or 4 inches shorter than before these pains were noted These pains were so severe that the patient had to remain in bed He remained in bed from March, 1925, to May, 1925 The "shooting pains" in the various parts of the body persisted in spite of the rest in bed, and muscle twitchings were also noted. Since May the patient has been up and about and has been walking without any appreciable difficulty

As he walks you will notice some peculiarities in his gait. The thighs seem to be thrown outward and forward, and the general appearance is not unlike that of patients with Paget's disease of bone. The body seems to be shortened and when the patient's back is examined there is a relatively long kyphosis, suggesting the involvement of a number of vertebrae Pressure over the bone elicits tenderness

The patient appears anæmic. Blood examination reveals a hemoglobin of 40, 1,800,000 red blood corpuscles, 12,000 white blood corpuscles Urine—Sp gr., 1005, sugar 0, albumin, many red, few white corpuscles and bacteria

An X ray examination of the skeleton showed marked, diffuse changes in the pelvic bones, in the femora, in the bones of the forearm and in the skull (Figs. 1 and 2) There are areas of softening without bone formation These changes are quite different from those of Paget's disease, in which usually there is some bone production There is not the cottony appearance of the bones of the skull, such as is seen in Paget's disease After an X ray examination I would say that the diagnosis rests between some metastatic tumor in the bone and multiple myeloma There are certain findings which would suggest a hypernephroma. This patient from time to time has had blood in the urine. It has appeared in such quantities that the patient has noticed it. Examination of the kidney reveals no palpable tumor, but remember in this connection that a very small hypernephroma may cause very extensive secondary growths in bone

I have seen much the same picture caused by secondary prostatic carcinoma. Both hypernephroma and prostatic carcinoma frequently form metastatic growths in bone This patient is but forty years old, and prostatic carcinoma is unusual at this early age

Another feature of the clinical history speaks against metastatic carcinoma of bone and that is that this disease has lasted almost two years. The patient is still alive and at the present time is apparently better than he was last spring There has been at least no progression in the disease. The patient states that he is better

Another significant thing about this patient is the urinary findings. Bence-Jones bodies have been demonstrated in the urine. Fifteen cc of urine were acidified with 2 drops of 50 per cent. acetic acid, and the serum albumin coagulated by heating to boiling The urine was then filtered. The Bence-Jones bodies were demonstrated as a milky, suspended precipitate at 65° C, the cloudiness disappearing above 85° C and below 35° C These bodies were precipitated by adding two volumes of 15 per cent. alcohol to one volume of urine This precipitate was not altered by changes of temperature

The clinical history—pain and tenderness in and over the bones, shortening in stature, the X-ray findings, and Bence-Jones bodies—makes the diagnosis of multiple myeloma practically certain. One of these masses in the bone is

FIG 1



X ray picture of a multiple myeloma of the skull showing the peculiar punched out or peppered appearance occurring in multiple myeloma

FIG 2



Peculiar shadows in the humerus occurring in multiple myeloma

Fig 3



Histological preparation of a plasma cell myeloma

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relatively superficial and tissue can easily be removed from this place for a histological examination

[An incision was later made over this area just below the left trochanter, the thin cortex of bone was removed, and the fleshy-like mass which bled freely was exposed. Some of this was removed with a curette. When a section of this was studied, a diagnosis of plasma cell myeloma was made (Fig 3)]

Myeloma occurs as a primary multiple tumor of the bones, which develops in the bone-marrow and histologically is composed of the parenchyma cells of the marrow. Depending upon the type of cells which predominate the myeloma is spoken of as the myeloblastic, the myelocytic, the lymphocytic, erythroblastic or plasma-cell type.

In 1873, v. Rustizki described the first case belonging to this group and suggested that it be called a myeloma. Kahler in 1889 emphasized the clinical significance of these cases and called attention to pathognomonic significance of Bence-Jones bodies in the urine. Multiple myeloma is frequently referred to as Kahler's disease. Since Kahler's description it has been shown that the syndrome given by him is not restricted to multiple myeloma, but may occur in other primary, multiple tumors of the marrow—e g, the so-called endotheliomas—and has occasionally been observed in secondary carcinoma of the marrow. It is better, therefore, to speak of Kahler's symptom complex, rather than of Kahler's disease.

As a rule myeloma affects many bones. It is primarily multiple, and the tumors appearing in different bones of the skeleton should not be regarded as secondary. Occasionally the entire marrow of a bone is involved diffusely. In the case under discussion the mass from which the tissue was removed for examination was soft, grayish-red and very vascular.

The flat and short bones, ribs, sternum, vertebræ, pelvic and cranial bones, including the petrous portion of the temporal, the ethmoid and sphenoid, are involved first, less frequently the long pipe bones. In this case, however, the changes in the bones of the extremities are as marked as those in the short bones. It is interesting to note that myeloma formation has been observed in an ossified cricoid cartilage. In the flat and short bones the spongiosa is destroyed and the cortical bone becomes a thinned, parchment-like shell. The bone may become irregularly expanded, masses of the myeloma appearing on the surface of the bone. Fractures are common.

In this case the lumbar vertebræ are compressed, suggesting somewhat the changes observed in Pott's disease. The compression and crushing of the vertebræ account for the reduction in the stature of this patient, which he has himself noticed and of which he is very certain. There is not found in these cases the symmetrical expansion of bone such as is observed in osteitis fibrosa.

It is interesting to note that these changes may not be confined to the skeleton. Of parenchymatous organs, the liver is probably the most frequently affected. Myelomatous nodules have been found in the kidneys, in the lymphatic nodes, hard palate, in the ovaries, adrenals, and in the serous coat of the stomach. These are probably primary tumors developing from the reticulum and not metastatic growths.

The clinical picture of multiple myeloma varies considerably. It usually has an insidious onset. Indefinite pains such as this patient complained of are frequently the first symptoms. Increase of pain after muscular effort is quite characteristic. In the later stages the pain persists when the patient is lying down. Paroxysms of severe pain may occur with the slightest movement. Sneezing, coughing or deep inspirations may cause severe pain. Pain on percussion of the bones is quite characteristic.

Myeloma is a disease of middle or advanced age. It may occur at an early age, however, for cases have been observed in children two, three and five years of age, respectively.

The diagnosis may be difficult at times, but the history of this case, the X-ray findings, the histologic examination of tissue removed and the Bence-Jones bodies make the diagnosis certain. Bence-Jones bodies are of great significance in differential diagnosis. They occur but rarely in secondary tumors of the marrow. Even if Bence-Jones bodies are not found in a large number of true myelomas their diagnostic significance is not lessened when found.

You will be shown a section of the tissue removed for histological examination. The cells are round, mostly of the same size. When thickly crowded together they may be polyhedral. The nuclei are eccentrically placed. Sometimes cells with nuclei lying at opposite poles are observed. The protoplasm of the cells which is not granular

is strongly basophilic and stains red with methyl-green pyronin. You can see from the section, better than you can conclude from a description, the character of the cells in this case (Fig 3)

CONGENITAL URETHRAL VALVE

This patient presents some very interesting findings. There is something very significant in the early history of this child. Spontaneous birth occurred at the eighth month. About three days after birth blood poisoning occurred from an infected navel. The child had a fever for about ten days, but was quite well afterwards. During this illness, it was noted that the child had a tremendous abdomen. This enlargement was caused by a distended bladder according to Doctor Finkelstein.

The following story of the present illness is given by the father. The boy, who is eleven years of age, was quite well until one month ago. On the afternoon of September 20th after attending an exciting movie, he vomited once. This vomiting was dismissed as an ordinary gastric upset, and that evening the boy left for school in Washington. He arrived in Washington on the morning of September 21st and after a tiresome trip through one of the large buildings, he slept for four hours in the afternoon—a somewhat unusual thing. The boy was left in Washington and did not see his father again until the 27th of September, at which time the boy stated that he had vomited once. He did not seem well, had a bad color, seemed unhappy and disinterested. During the next four days he was with his mother.

He vomited once during this time. On October 12th he was seen by Doctor Kaufman, of Washington, who found albumin in the urine, and bilateral masses in the abdomen in the kidney region. No further vomiting occurred until October 18th and 19th. He was then examined by Doctor Vanderhoof, of Richmond, who found an anemia, bilateral abdominal masses, nitrogen retention, and a fruity odor of the breath. During the three days previous to entrance to the hospital on October 22nd, he vomited several times. On questioning the mother it was found that during the past year the boy has not felt well. He has seemed apathetic and "draggy." Morning nausea without vomiting has been noted frequently. Headaches have occurred frequently. These have usually come on late in the day and were due, as the mother thought, to eye strain and the movies. The following statement is of the greatest significance. During the past year the boy has arisen frequently in the middle of the night to urinate. Urination has been accompanied by straining. No abnormalities in the urine have been noted.

The boy's face is a little full and pasty, and he appears to be uræmic. There is definite creatinin retention.

When the abdomen is examined there are some striking findings. The lower part of the abdomen is unduly prominent. In the right lower quadrant just above the crest of the ilium is a bologna shaped mass. This extends obliquely from above and to the right downward and to the left toward the bladder. This mass lies apparently just beneath the abdominal wall and is freely movable. Upon deep palpation a mass is found on each side in the region of the kidney.

There is undoubtedly a large kidney on each side. Just above the pubis is a definite resistance, although the bladder cannot be palpated in this region.

Rectal examination reveals some very significant findings. Upon introducing the finger into the anus, a mass is found which is easily palpated. This mass lies very low, is elastic and seems to be the bladder, the walls of which are greatly thickened.

In this clinical picture then there is an involvement of the entire urinary tract above the urethra. The bladder is thick walled and contracted, and both kidneys are enlarged. This is probably a hydronephrosis. It is difficult to explain one thing in this clinical picture, and that is, the mass extending obliquely through the lower right half of the abdomen. This might be a distended ureter, but it is very large and it is also very superficial, lying apparently just beneath the anterior abdominal wall. It would be difficult for a distended ureter to have this superficial position, although it might become this large. I should say that this was probably some anomaly, perhaps a diverticulum of the bladder.

The history is also significant. Some urinary retention evidently occurred at birth, and during the past year there has been difficulty in urinating. This obstruction occurring in the posterior urethra is probably due to a congenital urethral valve, one of the most common causes of urethral obstruction in the young.

In the *Journal of Urology* (vol 3, 1919) appears an article by Doctors Young, Frontz and Baldwin, dealing with "Congenital Obstruction of the Posterior Urethra." According to them the earliest mention of the condition was made by Langenbeck in a work on "Lithotomy" published in 1802. In 1832 Velpeau described several anatomical specimens in which there were found in the posterior urethra valve-like folds. In 1912 the first clinical diagnosis of valvular obstruction of the posterior urethra was made, and operated upon by one of the authors of the above article. These valves are of embryological origin. Bazy published an article in 1903 in which he contended that the urogenital membrane of the embryo would occupy in the later stages of development a position corresponding to the most frequent site of the valves under consideration, and believed that these valves were due to a persistence of part of this membrane.

It is interesting in this connection to remember that an epithelial concrescence occurs in the development of certain organs. An epithelial concrescence occurs in the larynx, and the persistence of the concrescence accounts for the laryngeal diaphragm which is occasionally found, and accounts for the death of some babies. An epithelial concrescence also occurs in the duodenum. This was described by Tandler, who thinks that in many cases of atresia of the duodenum, the cause of the same is the failure of this concrescence to disappear.

Such a conerescence or persistence of parts of the urogenital membrane may account for some of these congenital urethral clefts

These are rare clinically, but should be thought of when a child develops difficulty in urinating, both kidneys become enlarged, and a small, thick-walled, contracted bladder is found. If the walls of the bladder do not become too greatly thickened, this viscus may be somewhat distended

[Later Doctor Frontz catheterized this child. An obstruction was found in the posterior urethra. The valve or a portion of it was removed by a punch operation. The bologna-like mass in the lower right quadrant disappeared, urination became practically normal, and the general condition of the child greatly improved.]

CONGENITAL PYLORIC STENOSIS

This male child, eleven weeks old, began to vomit when about three weeks old. The mother did not have sufficient milk after one month, and artificial foods were then resorted to. Vomiting has persisted in spite of any food that was tried.

This case is quite typical. Vomiting has persisted and the child has continued to lose weight. The child, as you see, is emaciated. When the abdomen is inspected, it is seen that the epigastrium is full and peristaltic movements are noticed. They are very definite. We will give the baby some water and see what happens. The baby takes the water very well. After waiting some time the water is expelled with considerable force. This is projectile vomiting. The peristaltic waves occurring before the vomiting are very decided. The stomach seems to be knotted. I am unable to palpate a tumor at the pylorus.

Vomiting beginning from the second to third weeks and persisting in spite of change in food, active peristalsis and projectile vomiting are characteristic of congenital pyloric stenosis and warrant this diagnosis even when a tumor cannot be palpated.

Hezekiah Beardsley apparently was the first to give a description of congenital pyloric stenosis. He was one of the original members of the New Haven County Medical Association. In April, 1788, he reported a case of scirrhus in the pylorus of an infant which was the first case on record of congenital hypertrophy of the pylorus in an infant. This was printed with the papers of the society which appeared in their transactions, entitled "Cases and Observations." In this paper Beardsley noted practically every feature of the disease as we now know it. He had attended the patient for three years at Southington, and when her death at the age of five "closed the

painful melancholy scene," he performed the autopsy. Constant puking was noticed during the first week of life. All the food which the child took was almost instantaneously vomited and but little changed. The fæces were small in quantity. The child was thin and had a wizened, old look. A pronounced scirrhusity in the pyloric region was found months before the child died. Beardsley at first thought the condition due to a deficiency of bile and gastric juices combined with a relaxation of the stomach. Unfortunately, he did not know of the child's death until two days after it had occurred. The almost intolerable stench and the impatience of the people who had collected for the funeral prevented as thorough an examination as might otherwise have been made. The stomach was unusually large and distended. "The pylorus was invested with a hard, compact substance or scirrhusity, which so completely obstructed the passage into the duodenum as to admit with the greatest difficulty the finest fluid."

This is apparently the earliest description of congenital pyloric stenosis. Many years after this Hirschsprung described congenital pyloric stenosis, and he is generally given the credit for having described the syndrome. Beardsley's description is, however, very accurate. Few children survive as long as did the child observed by Beardsley, although cases are reported from time to time in which the stenosis has persisted for years (Oliver's case).

The treatment of this lesion is well established. There may still be some discussion as to whether these children should be treated medically or surgically. There is no doubt in my mind that practically every case of congenital pyloric stenosis is a surgical case. Attempts at correction by feeding should not be continued too long, for the child may become a bad surgical risk. Resection of the pylorus and gastro-enterostomy have been given up because of the high mortality. The operation that is employed to-day is the Fredet-Rammstedt. It can be performed under local anæsthesia. The child is bound on a board, for it can be handled easily this way. The incision should be made high through the right rectus muscle. When properly made the liver will prolapse into the wound and loops of intestine do not escape. The pyloric end of the stomach can then be picked up and delivered on to the abdominal wall. The hard, white, apparently œdematous mass is then grasped between

the index finger and thumb of the left hand, and an incision made through the mass parallel to its long diameter. Great care should be exercised not to carry this incision too far on the duodenal side, for the mass ends abruptly here and the duodenal mucosa may be nicked. After the mass has been incised about half way through, the incision should be widened by artery forceps. The fibres tear and finally the mucosa herniates through the wound. All of the constricting fibres should be separated in order to prevent the continuation or recurrence of the stenosis. Occasionally it is necessary to ligate one or two small vessels. Usually the oozing can be easily controlled by small, hot, moist sponges.

Especial care should be exercised in suturing the abdominal wound. A roller bandage is placed around the abdomen. This is held in place by thin strips of adhesive encircling the abdomen.

Feeding may be resumed at once. The Fredet-Rammstedt is the simplest procedure, attended by the best results, and is the only one that should be considered in the treatment of congenital pyloric stenosis.

After gastro-enterostomy the mass persists for some time. I have had the opportunity of examining the pylorus of a child who died more than nine months after a gastro-enterostomy of bronchopneumonia. The mass at the pylorus at this time appeared the same as it did the day the gastro-enterostomy was performed.

SENILE ARTERIOSCLEROTIC GANGRENE

This patient, a woman seventy three years of age, has been having some trouble with the left foot since the 6th of July of 1926. She has had more or less pain and considerable aching. There has developed within the last few days a dark area upon the end of the great toe, which, as you see, extends up to and beneath the nail. The skin is black and dry. Surrounding this area of dry gangrene is a reddish blue area which indicates an attempt to demarcate this dry gangrene. The peripheral arteries are sclerotic and therefore this may be called a senile or an arteriosclerotic gangrene.

I will read to you Sir Percival Pott's first description of this lesion, which is sometimes referred to as Pott's sore toe. The description is clear and is a beautiful example of careful clinical observation. In Pott's "Surgery" (Vol. 2, published in 1819) is a chapter entitled "Observations on the Mortification of the Toes and Feet." I quote the following "That the powers of Peruvian bark

are known to almost every practitioner in physic and surgery. Among the many cases in which its merit is particularly and justly celebrated are the distempers called gangrene and mortification, its general power of stopping the one, and resisting the other has made no inconsiderable addition to the success of the chirurgic art, but still there is a particular species even of these in which this noble medicine most frequently fails. I mean that particular kind, which, beginning at the extremity of one or more small toes, does in more or less time pass on to the foot or ankle, and sometimes to a part of the leg, and in spite of all the aids of physic and surgery most commonly destroys the patient.

"It is very unlike to the mortification from inflammation, to that from external cold, from ligature or bandage, or to that which proceeds from any known cause, and this in its attack as in its progress. In some few instances it makes its appearance with little or no pain, but in by much the majority of these cases the patient feels great uneasiness through the whole foot and joint of the ankle, particularly in the night, even before these parts show any mark of the distemper, or before there is any other than a small discolored spot on the end of one of the little toes.

"It generally makes its appearance first on the inside or at the extremity of one of the smaller toes by a small, black or bluish spot, from this spot the cuticle is always found to be detached and the skin under it of a dark red color.

"If the patient has very lately cut his nails or corn, it is most frequently, though very unjustly, set to the account of such operation.

"Its progress in different subjects and under different circumstances is different, in some it is slow, and long in passing from toe to toe, and from thence to the foot and ankle, in others its progress is rapid and horribly painful. It generally begins on the inside of each small toe, therefore it is visible either on its under or upper part, and when it makes its attack on the foot, the upper part of it shows first the distempered state by tumefaction, change in color, and sometimes by vesication, but wherever it is, one of the first marks of it is a separation or detachment of the cuticle."

This description covers the early clinical signs of arteriosclerotic gangrene as we see it. The relation, however, of the development of

FIG 4

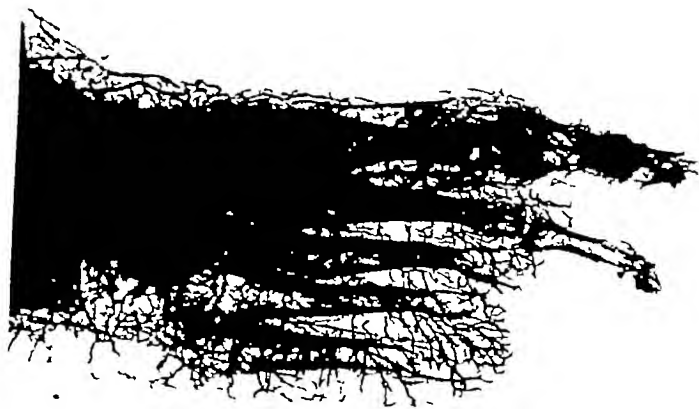


X ray picture of the injected vessels in a case of arteriosclerotic gangrene showing the absence of collateral circulation

FIG 5



FIG 6



X-ray pictures showing injected vessels in a case of gangrene occurring in thrombo angitis showing extensive collateral circulation

gangrene to the trimming of a nail or paring of a corn must be emphasized because the trauma connected therewith may determine the beginning of the gangrene, or the inflammation which develops may add an inflammatory to the already existing gangrenous process and lead to a rapid extension of the same

The arterial changes in this type of gangrene are entirely different from those observed in thrombo-angitis obliterans—the pre-senile type Both are chronic lesions In the arteriosclerotic vessel little, if any, collateral circulation is formed

There is no sugar in the urine in this case Diabetes can therefore be excluded as a contributing factor in the development of the gangrene.

Every attempt should be made to prevent an infection in this case. The foot, leg and thigh should be wrapped in sterile cotton They should be kept warm to favor the development of a collateral circulation The extremity should be elevated

Figs 4, 5 and 6 illustrate the conditions seen in these cases

Undoubtedly an amputation will have to be performed in this patient It has been found as the result of much experience that it is better to amputate through the knee-joint or just above it, than to amputate lower down and then have to perform another amputation because of failure to heal Therefore an amputation will be performed through or just above the condyles, spinal anæsthesia being used

PROBLEM AND PRACTICE IN BILIARY SURGERY

By W WAYNE BABCOCK, M.D., F.A.C.S

Department of Surgery, Temple University, Philadelphia

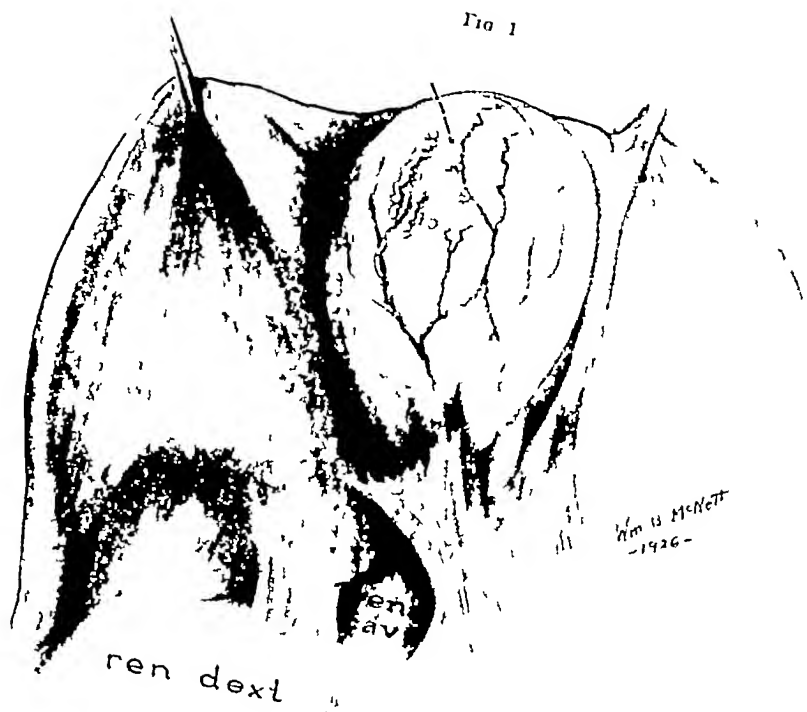
THE problems of biliary surgery are functional and technical. The functional problems, which indeed offer solution of many of the technical problems, are bound up with the physiology of the liver. As clinicians we eagerly turn to the laboratories, now so busily engaged in interpreting hepatic function, to seek a sound physiologic basis upon which to develop a rational diagnosis and treatment in biliary disease. Since John Stough Bobbs did the first successful cholecystostomy nearly sixty years ago, no decade has been marked by greater activity for the solution of hepatic function than the present one. But technical application has often run away from science. Experimental results are rushed from the laboratory without confirmation or calm philosophy, yet poor defective guidance may be better than none at all. It is better to work out scientific errors than to be content with pure empiricism. What does the liver do? Many of us were taught that it stored glycogen and excreted bile, but had very hazy ideas as to what this meant in the economy. Now our concepts, however incomplete, are larger and much more illuminating.

Our food intake is never precisely adjusted to our needs. While the tissue demands are continuous, our meals are taken at intervals and our diet is not balanced to the immediate requirements of the body. There are daily excesses or deficiencies. Heavy exercise or fever may burn much carbohydrate at times when food is not eaten or absorbed. Protein is often freely taken when it is not required for tissue replacement and need for lecithin may occur with a diet poor in fat. Hemoglobin waste occurs without replenishment from food ingested. It is the liver that is the great seat of supply, conversion, storage, detoxication and elimination of food products. Remove the liver and the fires of life quickly burn out, the body becomes uræmic, convulsed, or eclamptic from its poisonous proteins, dulled, acid, and insensitive from its poisonous hydrocarbons, shocked because absorbed poisons are not conjugated, stained by

RY

l
f

Fig 1



H₂O drops of gall bladder from obstruction of cystic duct wall thin distended by mucus

excess of pigment, and hemorrhagic from failure of calcium and fibrinogen to produce coagulation of blood

With the liver removed, death follows quickly unless, as Mann has shown, glucose is supplied to the blood. Without the associated combustion of glucose the fats do not burn down completely to carbon dioxide and water, but beta-oxybutyric acid, diacetic acid, and acetone are formed with the production of acidosis, stupor and coma. Following the removal of the liver there is failure to reduce the amino-acids to urea and the intermediate product, ammonium, is eliminated in excess, the blood-urea being reduced. The condition resembles that found in uræmia and eclampsia, and convulsions occur, especially if the animal is given a meat diet. Without the action of the liver, aromatic, split or toxic proteins produced by bacterial decomposition in the digestive tract and absorbed, are not conjugated with sulphuric or glycuronic acid into indoxyl sulphate, ethereal sulphates, and the like, and rendered harmless, but are found as indol, indoxyl, skatol, tyrosine, para-cresol or other poisonous substances.

The liver reminds me of the old-fashioned wood-burning stove on which bacon was fried (fat), in which cakes were baked (carbohydrate), and meat (protein) roasted. For successful service a continuous supply of wood (carbohydrate) was required which had to be dried and cut in suitable lengths for efficient use. The speed with which the wood was burned was regulated by a damper. Scraps of fat, meat, bones (calcium and salts) and the like were easily consumed if there was sufficient wood burning, but while fat and meat and salts might burn with little wood, they consumed slowly and with much offensive smoke and odor. Applying this crude comparison to the body, the fuel, glucose, must be continuously supplied to enable the liver to handle the fats, proteins and salts. The fuel is cut or converted into glycogen for storage before use and the rate of combustion is regulated by a damper, insulin. Fats, proteins, even toxic proteins and salts burn well with sufficient glucose, but burn poorly and form poisons if the carbohydrate supply is insufficient. For every form of hepatic deficiency, even that produced by anæsthesia with chloroform or ether, it is of importance that the supply of glucose be maintained.

The Known Functions of the Liver(1) *Conversion and Storage of*

- (a) *Sugar*—Glucose into glycogen.
- (b) *Fats*—Desaturated—Lecithin, possibly formed.
- (c) *Proteins*—Amino-acids into Ammonia and Urea
- (d) *Pigment*—Waste Hemoglobin, Converted in Part into Bilirubin (Animal Chlorophyl)

(2) *Metabolism of*

- (a) *Fibrinogen*—Anti thrombin and Calcium (Blood Clotting, Bone Hardening)
- (b) *Cholesterol*—Insulator, Cell Builder—De-esterized (?)
- (c) *Bile salts*—Eliminants, Digestants

(3) *Destruction of*

- (a) *Bacteria*
- (b) *Toxic Proteids*—From Intestinal Putrefaction Conjugated with Sulphuric or Glycuronic Acid to Harmless Ethereal Sulphates, Etc.
- (c) *Alkaloids*—Strychnine, Atropine, Nicotine, Etc

(4) *Sequestration of*

Mineral Poisons—Arsenic, Mercury, Phosphorus, Etc.

(5) *Elimination of*

Bile

The normal liver has a capacity greatly in excess of the body needs and, besides, has a marked ability to regenerate. Four-fifths of a dog's liver may be removed without evidence of metabolic disturbance, and nineteen-twentieths of the intrahepatic biliary ducts obliterated without the production of jaundice. The enormous excess capacity of the liver explains in part the failure of various tests employed to determine impairment of liver function.

In the liver, glucose is converted and stored as glycogen, to be reconverted into glucose to meet the need of the tissues. Proteins received as amino-acids are stored, or, if in excess, broken up into ammonia and urea for elimination by the kidneys.

In most animals, except the dalmatian coach dog, and man, uric acid is converted by the liver probably into allantoin. Fats from the food are stored, desaturated for better utilization, and converted in part into lecithin and possibly cholesterol. Fat from outlying fat deposits is recalled to the liver as needed for conversion and utilization. The monatomic alcohol, cholesterol, resistant to bacterial decomposition and digestion, used in the body to encase red blood-cells, to form the frame-work of other cells, to form the structure

of the nervous system and to protect the skin in sebum, is constantly present in blood-serum. It is eliminated by the liver through the bile to be re-absorbed from the intestines. Bilirubin physiologically and chemically akin to the chlorophyll of plants, formed from the hemoglobin of worn-out and destroyed red blood-cells, is stored and the surplus eliminated with the bile to be re-absorbed from the intestines. Even when bacteria break down bilirubin in the intestines into urobilin the liver removes it from the portal blood and reconverts it into bilirubin to be re-used for hemoglobin or other pigment.

Whipple contends that cooked liver is the best hematinic, and Minot and Murphy have recently reported remarkable improvement in 45 cases of pernicious anaemia following the daily feeding of large quantities of cooked liver.

Dogs with a biliary fistula preventing the entrance of bile into the intestine, sicken and die. In humans the constant calcium loss may be followed by softening of bones and other changes. Whipple and Hooper found that the condition was relieved by feeding cooked liver, but not by the administration of bile. These observations deserve further trial in clinical practice.

Fibrinogen, essential for the clotting of blood, and anti-thrombin, which limits the activity of fibrinogen, are developed by the liver. Calcium is eliminated with the bile in combination with bilirubin. In jaundice, calcium metabolism and the clotting of blood are inhibited from the combination of bilirubin with the blood calcium. Intravenous injections of calcium chloride, as suggested by Watson, have proved of value in preparing patients with jaundice for operation.

Bacteria absorbed from the gastro-intestinal tract are killed and disintegrated in the liver, the waste-products being eliminated with the bile as shown many years ago by Adam.

Nicotine, strychnine, and other alkaloids are destroyed in the liver, arsenic, mercury and phosphorus held, anaesthetics and narcotics combine with the lipoids in the liver. The blood-lipoids are increased during ether narcosis, and after the narcosis by chloroform or morphine. Quantities of poison which the healthy liver is able to store or detoxicate may be fatal when the liver is diseased or degenerated, thus, salvarsan injections are very dangerous and may be fatal in syphilitic or malignant disease of the liver. In carcinoma with degeneration of the liver the routine use of mor-

phine to relieve pain is followed by very rapid failure, stupor and often death within a few days. Chloroform, ether and morphine are harmful when given to patients with advanced hepatic disease. Hyoscyne, atropine, strychnine and other poisonous alkaloids, normally destroyed in the liver, should evidently be avoided or used with great caution in advanced diseases of the organ. Tests necessitating starvation, or the injection of dyes or other possible poisons, should be withheld immediately before operation.

The bile carries pigment, bile-salts, cholesterol and water from the liver. The flow of bile is greater during the day and particularly after meals. I think it reasonable to suppose that the flow of bile toward the gall-bladder for storage and concentration during the day-time explains the great tendency of stones to become lodged in the neck of the gall-bladder with the production of colic at night, when the flow may be toward the ampulla. Without distention gall-bladder colic, of course, does not occur.

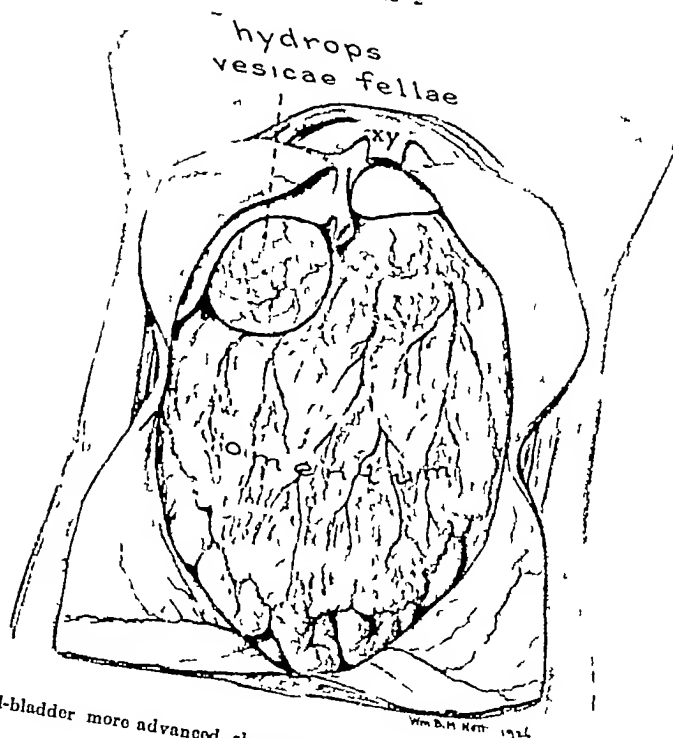
In the intestines additional portions of water and salt together with pigment and cholesterol from the bile are absorbed to be again used in the body. The continued loss of all bile from the body, which is fatal in dogs, is harmful in man, and it is our experience that patients with a chronic biliary fistula show less resistance to operation than those who have not had this loss. For these patients, not only should the fluid intake be greatly increased, and glucose, calcium and bile-salts given, but the daily feeding of cooked liver should be considered.

It is evident that the various hepatic functions will be more or less impaired in disease. Especially important is the failure of the liver to supply a sufficient quantity of glucose for combustion.

Glucose Deficiency Results in

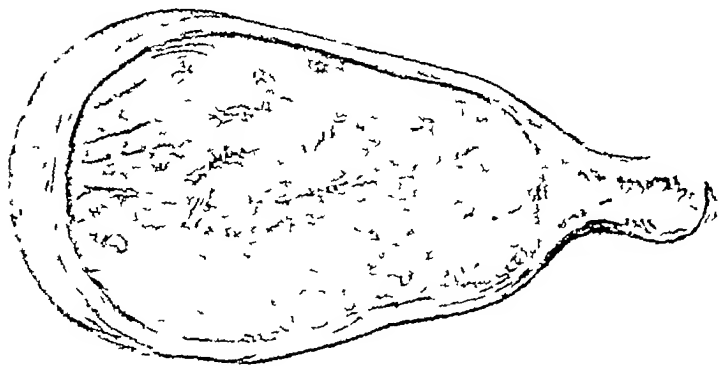
- (1) *Deficient Combustion*—Loss of Heat and Energy
- (2) *Imperfect Combustion of Fats*—Formation of Diacetic Acid, Acetone with Acetonæmia, Acidosis, Coma, Vomiting, Drowsiness, Stupor, Acetone Odor to Breath. Fall in Alkaline Reserve. Rise in Ammonia in Urine.
- (3) *Imperfect Conversion of Amino-acids into Ammonia, and Urea*—with Uræmia, Convulsions, Eclampsia
- (4) *Imperfect Detoxication Conjugation of Split Proteins*—Formation of Tryptophan, Indol, Indoxyl, with Vasomotor Depression, Shock. Indoxyl, Sulphuric Acid, Ethereal Sulphates Not Properly Conjugated by Sulphuric or Glycuronic Acid.

Fig 2



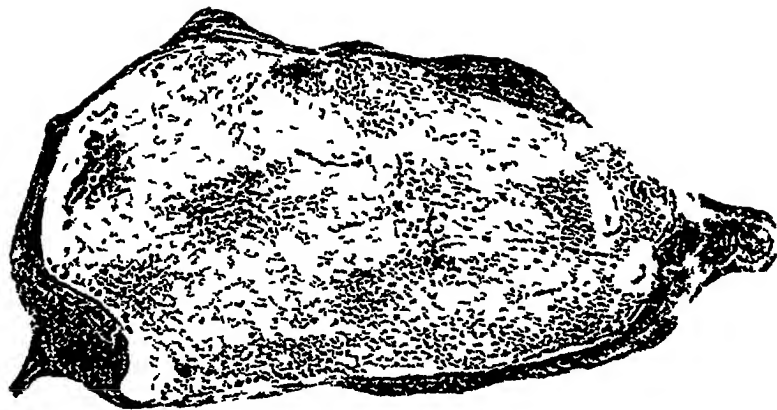
Hydrops of gall-bladder more advanced showing thin distended wall of the gall-bladder with arborescent blood vessels

Fig 3



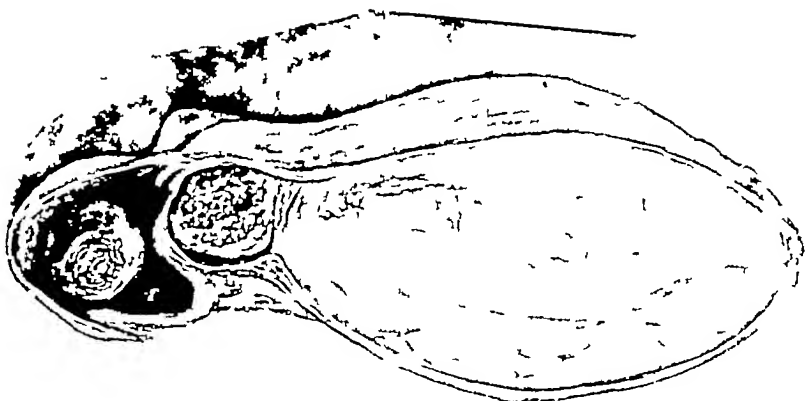
Chronic catarrhal cholecystitis
gall bladder moderate degree
flecking being due to denudation of the papillae
and deposit of cholesterol

Fig 4



Chronic catarrhal cholecystitis
gall-bladder, more advanced type
strawberry

Fig 5



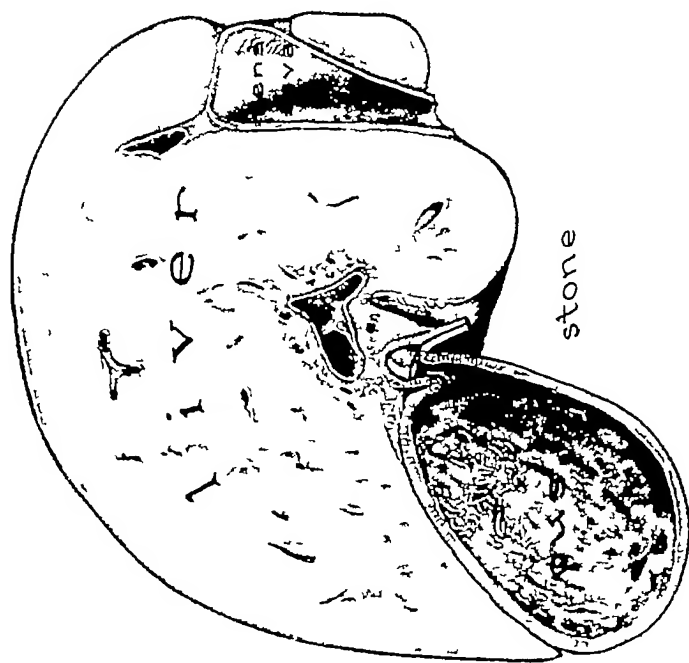
Gall bladder obstructed by two stones caught in the valves of hepatic duct. Non purulent cholecystitis

Fig 6



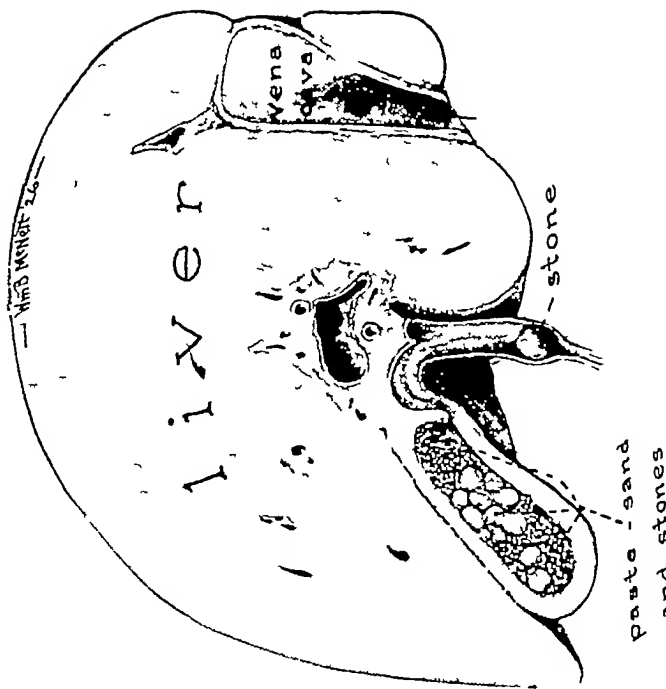
Advanced mucopurulent cholecystitis from calculus impacted in cystic duct

FIG 7



Purulent cholecystitis from stone obstructing cystic duct

FIG 8



Small, contracted thickened gall-bladder filled with gall-stones, bile-sand and bile-mud characteristic of recurrent calculus obstruction of the common bile-duct

- (5) *If There Is Complicating High Ictus*—Chloride Deficiency—Alkalinoses with Vomiting, Tetany

Jaundice Is an Excess of Bilirubin in Tissues

Bilirubin is formed from waste hemoglobin by Kupffer cells in the reticulo endothelial system of liver, spleen, bone marrow, and other organs, is stored in liver and eliminated with bile

Jaundice Is Characterized By

- (1) *Pigmentation*
- (2) *Deficient Available Calcium*, Fibrinogen, Glucose, Water
- (3) *Ochloemia*
- (4) *Tests*—(a) Van den Bergh (b) Icterus Index

Tactics

- (1) *Biliary or Obstructive*—Remove Stone or Other Obstruction
- (2) *Hepatic, Toxic or Infectious*—(Polygonal Cells of Liver Fail to Convey Bilirubin of Blood into Bile) Treatment for Hepatic Deficiency—Cholecystogastrostomy
- (3) *Hemolytic*—Reduce Production of Bilirubin as by Splenectomy

In jaundice the bilirubin of the blood fixes the calcium. As calcium is not available there is a tendency to hemorrhage, softening of bones and possibly tetany. The function of the liver is also seriously impaired. Jaundiced dogs no longer detoxicate benzoic acid, a product of proteid decomposition. With non-obstructive jaundice urobilin formed by bacterial decomposition of biliverdin in the intestines or biliary ducts and carried to the liver by the portal blood is no longer removed by the liver, but is eliminated by the kidneys. This occurs when one-third of the liver is removed experimentally. The greatly increased danger of operations upon jaundiced patients is well known.

GALL-BLADDER

The gall-bladder has a capacity of about 30 c c or a little less than one hour's secretion of bile. In the gall-bladder bile is concentrated to one-tenth of its previous volume, salt, pigment and water removed through the lymphatics, and mucus added. The gall-bladder is filled by the pressure in the biliary ducts. A tension bulb, its walls contain elastic tissue but relatively little muscle, and active contraction of the gall-bladder has not been conclusively proved under any form of stimulation. Evidently it only empties passively through its own elasticity and by the pressure of adjacent organs. Copher has shown that it is never completely empty.

Meltzer's theory of contrary innervation, as applied to the gall-bladder, has during recent years been refuted by many observations. The sphincter of Oddi varies greatly in muscular development and seems rather unimportant. The flow of bile and pancreatic juice from the ampulla is controlled by the contractions of the duodenum rather than the sphincter of Oddi. The common duct runs obliquely one, two or more centimetres through the duodenal wall, and during duodenal contraction is obstructed, while peristaltic waves of the duodenum have a milking effect causing spurts of bile to be ejected (Copher and Kodama). The flow of bile is stimulated more by oleic acids or a fat meal (egg-yolks and cream or pituitrin) than by magnesium sulphate in the duodenum. Under an anæsthetic the pressure of bile in the gall-bladder is from one hundred to two hundred millimetres of water, and from seventy-five to one hundred millimetres in the common duct. At six hundred millimetres the obstruction in the duodenal wall is forced.

Inflammations of the gall-bladder may be tabulated as follows

CHOLECYSTITIS

First Stage—*Cholecystic Catarrh*—Age 10 to 35

Digestive, Toxic and Focal Symptoms. Operative Mortality Slight

Second Stage—*Stone Cholc*—Age 35 to 55

Cholecystic Attacks. Operative Mortality Moderate

Third Stage—*Serious Complications*—Age 55 to 75

Gangrenous Cholecystitis, Peritonitis, Pancreatitis, Intestinal Obstruction, Hepatitis, Hepatic Abscess. Operative Mortality High.

The gall-bladder may become infected through the blood-stream, through the bile, by an ascending infection from the duodenum, by a contiguity of inflammation, and by infection from the liver through the communicating lymphatics. Graham has emphasized the importance of this last method. The sequence being

- (1) Infection in the portal area, as from appendicitis
- (2) A secondary portal infection of the liver with hepatitis
- (3) The spread of the infection from the liver through the lymphatics to the gall-bladder

Symptoms—Despite the intensive study of the physiology of the liver during the last ten years, the diagnosis of gall-bladder disease depends largely upon clinical observation. It is the rule that the gall-bladder once seriously infected, is always infected.

Infections of the gall-bladder often develop during the first and second decades, but as the local symptoms are unobtrusive the condition often is overlooked. After fifteen to thirty years gall-stones usually have developed, so that the cholecystitis is commonly manifested by gall-bladder colic between the ages of thirty-five and fifty-five. After fifty-five serious secondary complications such as empyema of the gall-bladder, necrosis or gangrene of the gall-bladder, perforation and peritonitis, acute hemorrhagic pancreatitis, hepatitis, intestinal obstruction from gall-stones and other sequences are prone to occur. We can divide gall-bladder disease, therefore, into three stages.

First—The stage of cholecystic infection and cholecystic toxæmia, which develops between the ages of ten and twenty with suggestive symptoms, characterized by fulness and distress after eating, sour bitter eructations, belching, and, more rarely, vomiting. The dyspepsia is of the qualitative type rather than the quantitative dyspepsia of ulcer, that is, the patient shows idiosyncrasy to certain articles of diet, such as shell fish, boiled dinners, fried foods, pastries, fish and the like, and may not be influenced by the amount of food eaten. Idiosyncrasy toward certain foods and the inability to handle certain staple articles, such as milk or eggs, is suggestive of biliary disease. It is one of the most common conditions that causes the patient to report periodically to a physician for relief from so-called biliousness or indigestion, and which is relieved temporarily by fasting, dieting, alkalies, or by a calomel and saline course.

Secondary focal and toxic symptoms occur and include arthritic and muscular complications, treated under the name of rheumatism, myalgia, lumbago, chronic arthritis, neuralgia, bilious sick headache, or various ocular symptoms.

The *second stage* has as its characteristic symptom gall-bladder colic, the stones causing recurrent obstruction to the outlet of the gall-bladder. The attack is of sudden onset and usually occurs at night, often follows a heavy meal or dietetic indiscretion, frequently develops during or after pregnancy, and is characterized by a sense of great pressure and distress referred to the epigastrium. The pain radiates through to the back in the region of the eleventh right costal angle. The patient feels that vomiting would give relief, and tries to induce vomiting by putting the finger down the throat,

by taking soda, hot water, or laxative Vomiting may be followed by immediate relief Usually the pain is so severe that the patient sends for the physician and a hypodermic is administered The attack lasts from one-half hour to two or three hours, and the next day the patient is usually able to resume work Gastric hypo- or anacidity is common. Nocturnal attacks of acute indigestion in a middle-aged obese person, especially a woman with a sense of some internal pressure which the patient tries to relieve by inducing vomiting, and which requires a hypodermic injection of morphine, and is entirely relieved the day following, is almost surely a gall-bladder colic Cholecystitis with distention and catarrhal inflammation of the gall-bladder, without the presence of stones or the formation of pus, resembles a prolonged and mild attack of stone colic The upper abdominal distress usually lasts several days, a hypodermic is not required, as the pain is not as intense as that from stone, the patient avoids food and may attempt to obtain relief by vomiting, and the distended gall-bladder often may be felt below the costal border The onset and subsidence are less abrupt than that from stone, and a slight or moderate rise in temperature may be present. It is to be emphasized that in most subacute forms of cholecystitis, and in gall-stones, tenderness over the gall-bladder on palpation or percussion is more often absent than present. The patient usually complains of pain in the epigastrium or under the ensiform, and tenderness is much more marked here than elsewhere over the abdomen If one depends upon tenderness of the gall-bladder, Murphy's sign, Reisman's sign, to make a diagnosis he will overlook many cases

In the *third stage*, or stage of serious secondary complications, there usually is the history of preceding gall-stone colic. With a purulent or gangrenous cholecystitis the patient notes that the present attack is more severe and more prolonged than any that preceded it. A serious gall-stone colic that lasts over thirty-six hours usually is associated with pus formation in the gall-bladder, or necrosis of the wall The patient is nauseated and vomits, has a moderate temperature, 99° to 103° F, the color may be grayish, and the resistance of the enlarged gall-bladder projecting below the costal margin often is felt If greatly enlarged and inflamed the tip may come in contact with and inflame the parietal peritoneum at McBurney's point, and as the greatest tenderness is found here the examiner may mistake the

condition for that of appendicitis. This mistake should not occur if the examiner notes that the mass of resistant tenderness is continuous with the resistance that extends from under the right costal margin. Jaundice is not to be expected unless there is involvement of the common duct.

In acute pancreatitis the pain is of superlative degree, producing shock, and one-half, two-thirds or one grain of morphine may be required to relieve the excruciating pain. Free fluid in the abdomen rapidly develops, and there is increased resistance and tenderness in the epigastrium from the inflamed pancreas. An incision reveals the characteristic spots of necrosis in the abdominal fat, and the "beef broth" peritoneal fluid.

In a perforated gastric or duodenal ulcer the pain is also very severe and accompanied by shock so that the patient may suddenly fall to the ground. Usually the patient is younger and a man, and the greatest resistance and tenderness is often about McBurney's point as the erosive chyme first gravitates into the right iliac fossa. Rapidly developing evidence of free fluid and possibly gas in the abdominal cavity is suggestive, and at operation the presence of a mucilaginous bile or possibly blood-stained fluid in the peritoneal cavity indicates perforation.

CACHEXIA BILIOPRIVA

With an external biliary fistula there is waste of pigment necessary for hemoglobin formation, loss of calcium with its influence on blood clotting and on the hardening of bone, an increased tendency to tetany, loss of sodium salts with impaired digestion, and waste of fat and of ingested calcium. Normally calcium is held in combination by the bilirubin of the bile. In the absence of bile the calcium of the food combines with the fatty acids in the intestines forming an insoluble calcium soap, so that both the fat and calcium are lost to the body. There is also loss of fluid and dehydration, and the resistance of the patient to general anæsthetic or operation is decreased.

TESTS FOR BILIARY DISEASE

(1) *Cholecystography* (Graham-Cole) is based upon the fact that phenol tetraiodophenolphthalein is eliminated by the liver in the bile and collects and concentrates in the normal gall-bladder pro-

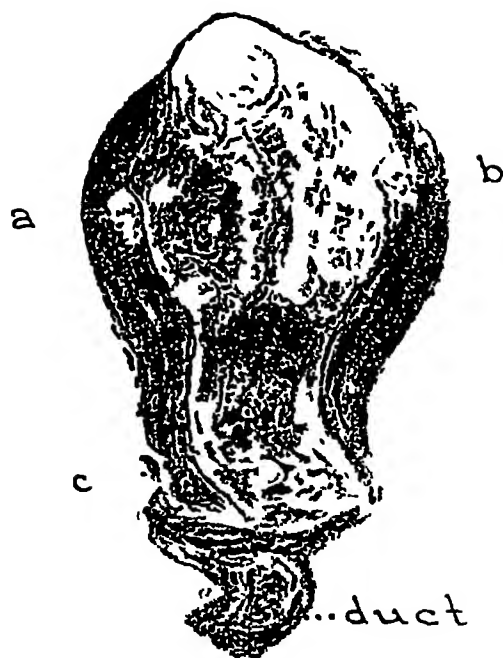
ducing a shadow upon the X-ray plate. Stones in the gall-bladder produce defects in the shadow and by this test over 90 per cent of gall-stones may be demonstrated, especially if the drug is given by intravenous injection. Graham claims the test to be 97 per cent effective when the drug is given intravenously, 75 per cent effective when given by mouth. A delayed or imperfect shadow in the gall-bladder indicates insufficient concentrating power, therefore disease of the gall-bladder, obstruction of ducts preventing bile from entering the gall-bladder or impaired eliminative power by the liver. The last probably is of little value as the gall-bladder has been well visualized by the test in acute yellow atrophy of the liver and in chloroform poisoning. During the test the patient should be starved to prevent the rapid emptying of the gall-bladder.

(2) *Icterus index*, which is normally 0.2 to 6, is determined by comparing the color of the blood-serum with standard solutions of potassium bichromate. Jaundice is visible when the icterus index is at 15, between 6 and 15 it is evident that latent jaundice is present.

(3) *Van den Bergh Test*—This is the diazo reaction applied to blood-serum and is a very delicate test for latent jaundice. The normal amount of bilirubin in the blood-serum is from 1–400,000, to 1–1,000,000. The unit employed is 1 to 200,000. The qualitative or direct test with prompt reaction is found in obstructive jaundice. In the early stage the reaction may be direct, delayed direct indirect or biphasic. Hemolytic jaundice usually is associated with an indirect or delayed direct reaction while a biphasic or combined reaction has been associated with jaundice from hepatic disease or toxic or infectious jaundice. The finer differentiations at first claimed have not been fully confirmed. The test is valuable in showing latent and slight forms of jaundice, and in indicating whether the jaundice is increasing or subsiding. Up to two units is considered normal.

(4) *Dye Elimination Test for Rowntree-Rosenthal*—Five milligrams of phenoltetrachlorophthalein are injected intravenously for every kilo of body-weight, or perhaps better two milligrams of bromsulphalein (Rosenthal) per kilo of weight. As these drugs are eliminated like bilirubin by the liver, the test depends upon the rapidity with which the dye is removed from the blood. Retention of the dye is not always associated with bilirubin retention, hence the test has a limited value and the injection produces a very trouble-

FIG 9



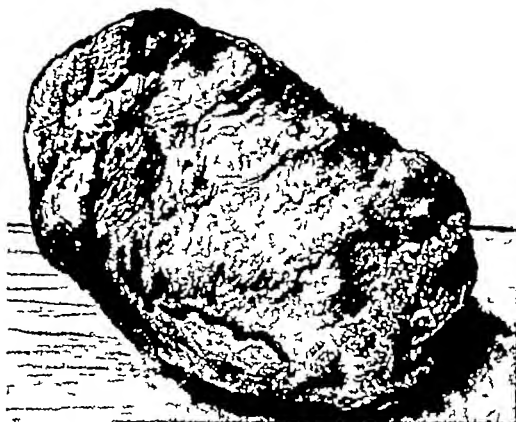
Necrotic or gangrenous cholecystitis gall bladder containing tarry and puriform bile mucus pus and stones

FIG 10



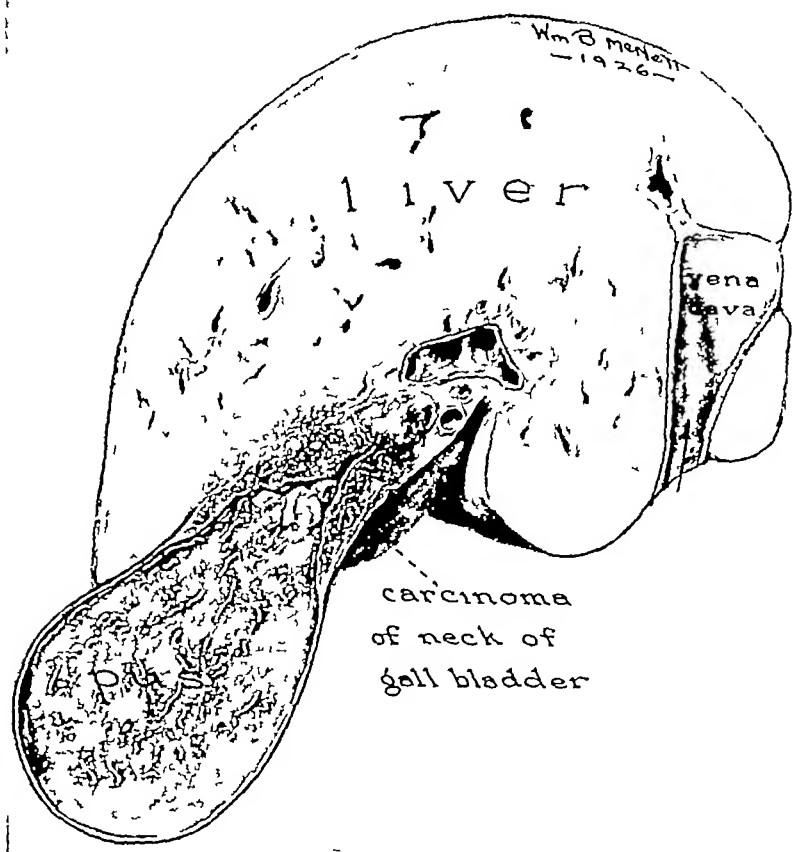
Stone 3.5 centimetres in diameter that obstructed small intestine

FIG 11

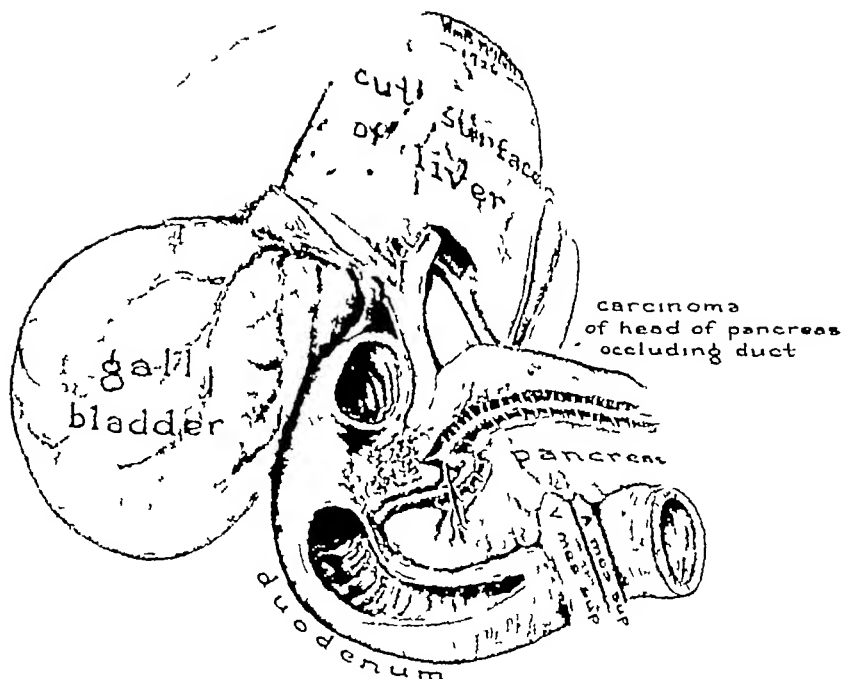


Gall stone 6.3 x 4 centimetres, that had ulcerated into large umbilical hernial sac then through gastric wall and that finally caused fatal duodenal obstruction

FIG 12

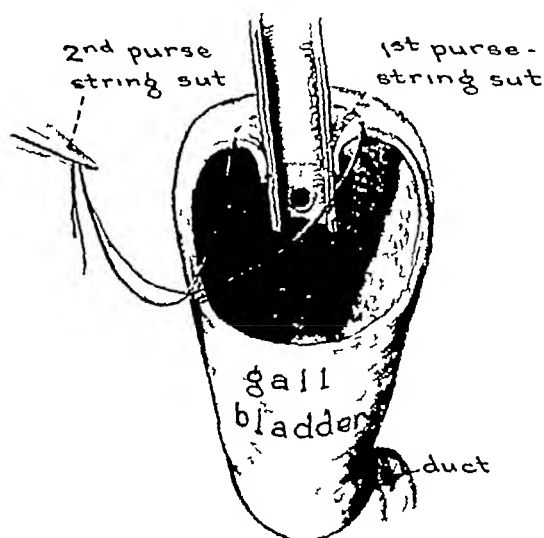


Carcinoma of the neck of the gall bladder with pus filled gall bladder Pus is often found with cancerous obstruction



Carcinoma of the pancreas obstructing common bile-duct with typical enlarged distended gall bladder
The palpable gall bladder with jaundice of Courvoisier

Fig 14

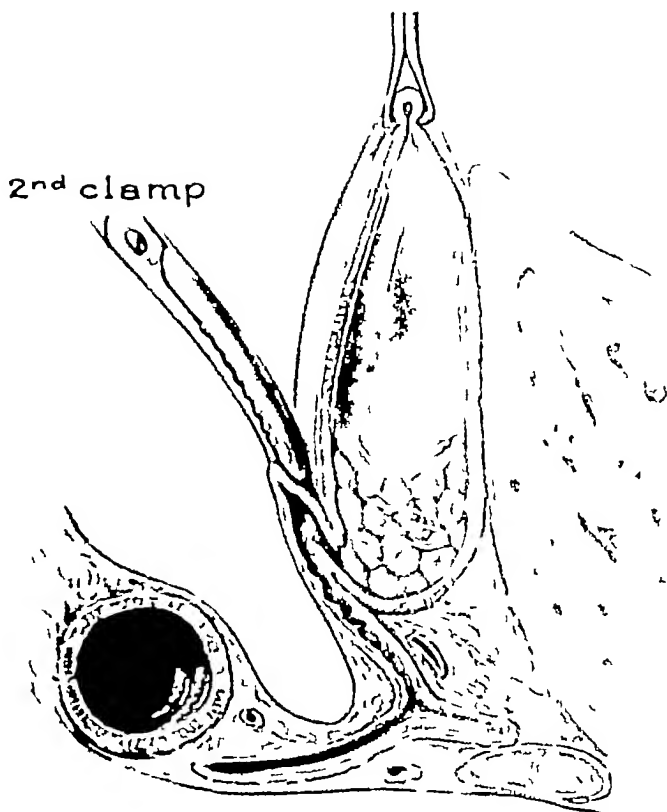


Cholecystostomy introduction of drainage tube in gall bladder with inversion of the edges of the gall-bladder by purse-string sutures

FIG 15



Cholecystectomy, elevation of overhanging neck of gall bladder to expose cystic duct and avoid injury to common bile-duct

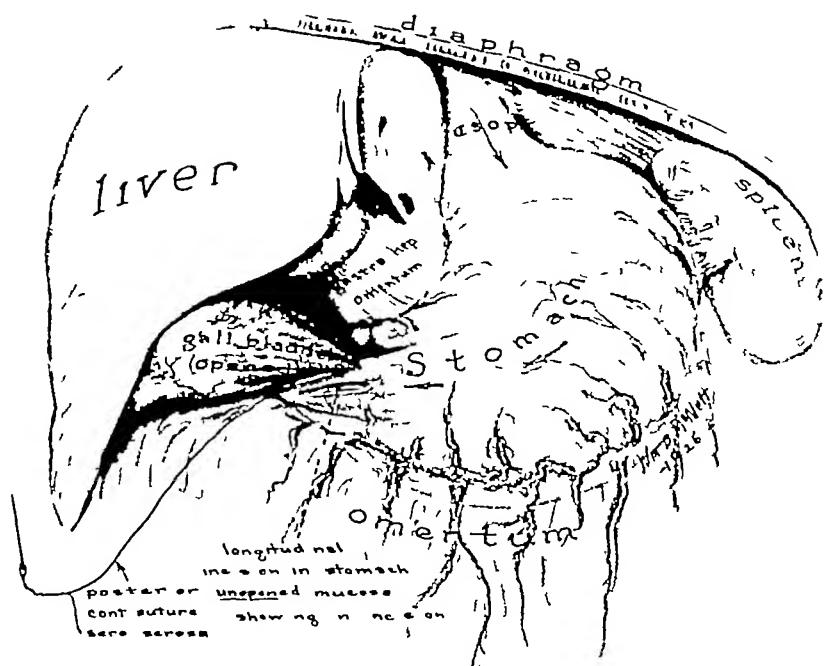


Application of second clamp to straighten out S-shaped curve at neck of gall bladder and expose cystic duct

FIG 17

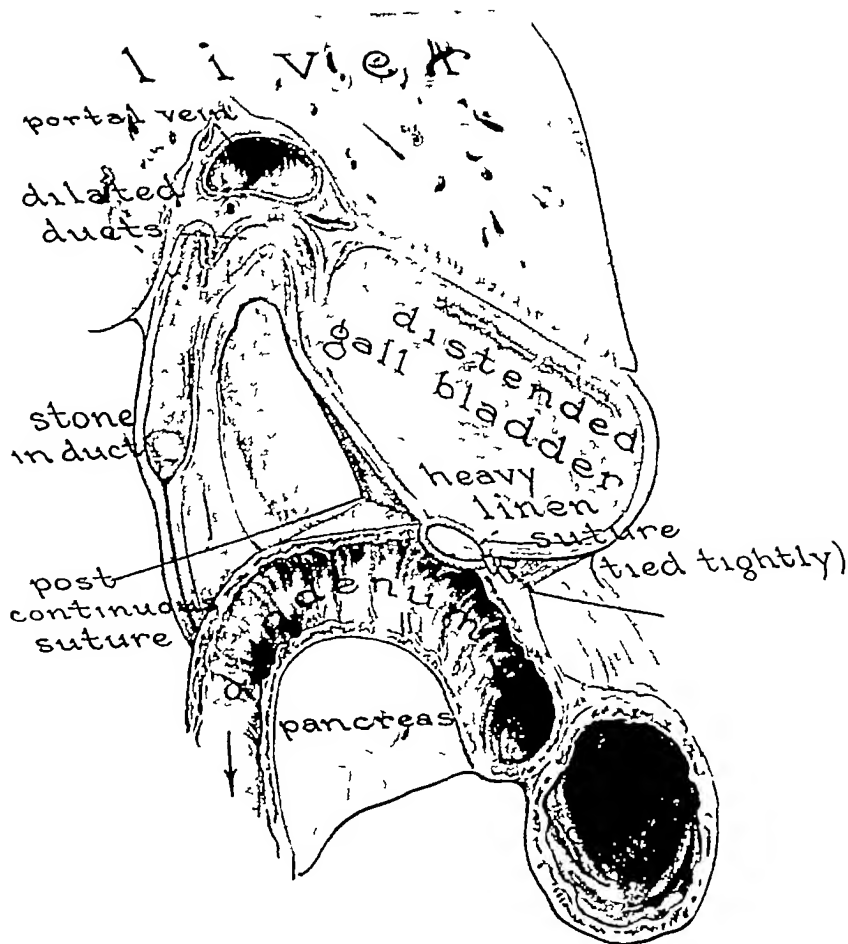


Cholecystectomy, covering of bed of gall-bladder by suture of visceral peritoneum of liver



Cholecystogastrostomy for chronic obstructive jaundice by the ligature method to produce slow decompression of gall-bladder

FIG 19



Illustrating ligature anastomosis, cholecysto-duodenostomy for gradual decompression of distended gall-bladder in jaundice

some thrombosis of the veins The test is of some value in the diagnosis of cirrhosis and carcinoma of the liver

(5) *Urobilin Test*—Urobilin is formed by bacterial action on bilirubin in the intestine or biliary ducts It is absorbed by the portal circulation and reconverted to bilirubin by the liver If from one-third to four-fifths of the liver is obstructed urobilin is not converted and eliminated by the liver, but escapes through the urine, urobilinuria Urobilinuria, therefore, indicates that bile is probably entering the intestine and that the liver is seriously damaged

(6) *Protein Metabolism*—The amount of urea-nitrogen in the blood varies with the efficiency of the kidneys In serious disease of the liver there is often a decrease of urea-nitrogen in the blood in relation to the total non-protein nitrogen with increased amount of ammonia in the urine This condition, however, may result from other causes.

(7) *Hemoclastic crisis of Widal* is based on the impaired ability of the liver to detoxicate the protein split products that circulate with an anaphylactic reaction (leukopenia) After an all-night fast two hundred c c of milk are given and the leukocytes counted every twenty minutes for one hour The test is of little value as a digestive leukopenia is not infrequent.

(8) *Carbohydrate Test*—A positive rise in the blood-sugar after the injection of thirty to fifty grams of levulose taken after a twelve- to fifteen-hour fast may suggest a disturbance in carbohydrate metabolism in the liver As extrahepatic organs may convert and store glycogen, the test is not reliable

In the diagnosis of biliary disease the laboratory tests, while interesting, for the most part should not be depended upon Tests for the retention of dyes eliminated by the liver, for levulose tolerance, for the conjugation of toxic proteins, all leave much to be desired The van den Bergh diazo test for bilirubin in the blood is of value in showing latent jaundice, whether the jaundice is increasing or decreasing either before or after operation, and in a limited way, in differentiating extrahepatic obstruction from hemolytic jaundice The clotting and calcium clotting time is instructive, although it does not always show what the tendency to hemorrhage will be during or after operation The plasma CO_2 combining power normally 56 to 65 volumes per cent gives a clue as to acidosis or alkalosis. Aci-

dosis, shown by an increased CO_2 combining power and an increase in blood chlorides, if sufficiently marked, results in convulsions or tetany. It is to be combated by the free use of liquids, glucose and alkali. It is noteworthy that in biliary obstruction acidosis is usual, where in high intestinal obstruction alkalinoses with decreased CO_2 combining power and a decrease of chlorides is to be expected. An ileus, however, may complicate biliary disease, and alkalinoses should be suspected if the patient has continuous, regurgitant vomiting of the upper intestinal type. Alkalinoses is to be treated by the free use of fluids, glucose, and sodium and ammonium chloride.

Final products of protein metabolism, urea and creatinin, show amounts in the blood that vary with production and with the eliminative power of the kidneys. Blood-urea, normally 26 mg per 100 c c of blood, is in serious excess when 125 mg or more are present. Blood creatinin normally 1.5 to 2 mg per 100 c c of blood, and 10 or more mg is a serious excess. A marked increase of either product is a danger signal. Blood chlorides, normally 566-600 per 100 c c of blood, are decreased in alkalinoses and increased with increased plasma CO_2 combining power in acidosis. Deficiency in available calcium as is usual in jaundice, not only favors operative and post-operative hemorrhage, but may lead to tetany, this has led to the general adoption of Walter's suggestion that 5 c c of a 10 per cent solution of calcium chloride be injected intravenously daily for three days before operation upon a jaundiced patient.

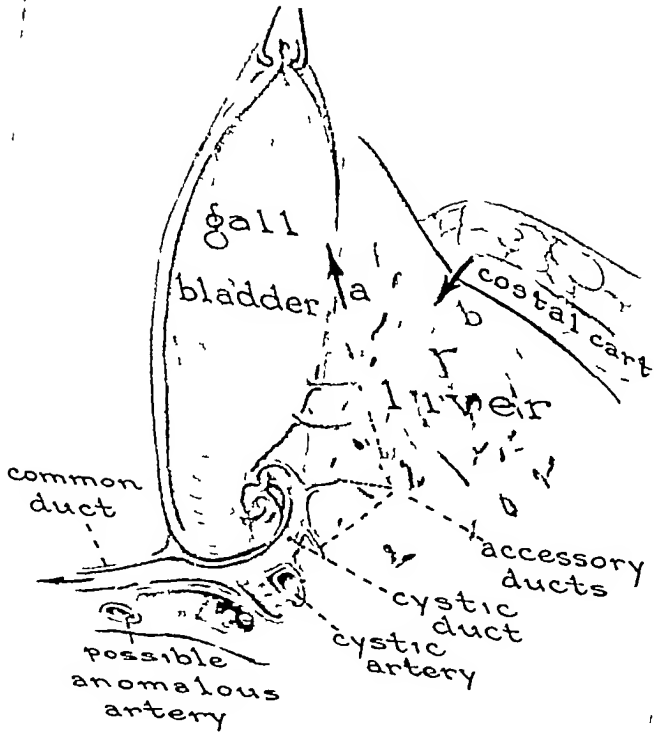
Many of the laboratory tests necessitate starvation, which, especially in fat persons, may lead to acidosis. The drugs employed also may have a toxic action upon the liver-cells. In the ill patient, therefore, tests requiring starvation or the employment of poisonous drugs should be avoided, and in all cases it is important to avoid these tests the week immediately preceding a serious operation upon the biliary system.

Before, during and after operation upon the biliary system the maintenance of biliary efficiency is most important.

TREATMENT OF HEPATIC DEFICIENCY

(1) In all cases (a) *water* (4000 to 8000 c c daily through mouth, rectum, subcutaneous tissues and veins), (b) *glucose* (500 to 1000 c.c. of tested 5 to 20 per cent. solution intravenously daily,

FIG 20



Dangers in cholecystectomy (1) Anomalous bile-ducts to gall bladder or common duct which may leak bile into peritoneal cavity if a drain is not used (2) Common duct that may be mistaken for cystic duct and divided if overhanging neck of gall bladder is not carefully raised and followed (3) Cystic or anomalous artery that may cause fatal hemorrhage if not occluded (4) Portal vein that may be lacerated or perforated by pressure of retraction or manipulation with fatal hemorrhage (5) Trauma to liver by traction or pressure

additional amounts by stomach and rectum, never subcutaneously),
(c) *elimination* (laxative, lavage, enemas)

(2) *Avoidance of ether*, chloroform, cyanosis (nitrous oxide), morphine, alkaloids, ment

(3) *Chlorides for alkalosis* (4000 to 8000 c.c. of physiologic salt solution, under skin or in veins daily), salt or ammonium chloride (200 to 500 c.c. of a 5 per cent solution by mouth or rectum daily)—high intestinal obstruction with vomiting, spasms, tetany

(4) *Alkalies in acidosis* (Fisher's solution 500 to 1000 c.c. intravenously, 200 to 1000 by rectum daily)—stupor, coma

(5) Calcium chloride in jaundice (5 c.c. of 10 per cent solution intravenously daily for three days before and, at times, after operation)

(6) *Cooked liver* (250 grams daily), bile and bile-salts in bile starvation (biliary fistula).

OPERATION

In operating for biliary disease one should be guided not only by the age and resistance of the patient but by the facilities and ability of the operator. The inexperienced operator, the operator with poor assistance, poor light, poor exposure of the operative field, had better do a relatively safe and easy cholecystostomy or cholecysto-gastrotomy, than a difficult and dangerous cholecystectomy. Cholecystectomy is an operation for the expert surgeon operating under ideal conditions, upon a patient in fair general condition, who is not toxic or jaundiced. With cholecystectomy the danger of accidental injury to ducts and blood-vessels, damage to the liver from traction, pressure, or laceration, secondary hemorrhage, and secondary leakage of bile, are all greatly increased.

INDICATIONS FOR SPECIAL OPERATIONS

(1) *Cholecystitis*

(a) Chronic or subacute—Cholecystectomy

(b) With stone—Cholecystectomy

(c) Purulent or gangrenous—

(1) In young with good resistance—Cholecystectomy or cholecystostomy

(2) In the old with poor resistance—Cholecystostomy

(iii) With advanced degenerative change in liver—cholecystostomy—prolonged drainage

(2) *Common-duct Obstruction*

(a) With slight jaundice—Choledocholithotomy or choledochostomy

(b) With intense jaundice—Cholecysto-gastrostomy Never cholecystectomy—Gradual decompression of liver—Removal of stones if required later

(c) Post-operative—Cholecysto-gastrostomy, cholecysto-duodenostomy or choledocho-duodenostomy

(3) *External Biliary Fistula*

(a) Liberation of fistulous tube and introduction into stomach or duodenum

(b) Reconstruction and suture of ducts over rubber tube

(c) Hepatico-gastrostomy or hepatico-duodenostomy

(4) *Recurrent Colic after Cholecystectomy*

(a) Explore, remove stones or other obstruction

(b) Prolonged drainage of common duct.

[The illustrations (Figs. 1-20) scattered through the text will bear careful study, as they elucidate the reading matter and show actual conditions met with by the operator in biliary surgery]

THREE CASES OF MORE THAN USUAL INTEREST

I Chorio-epithelioma Following Hydatid Mole in a Primipara

II Acute Torsion of a Solid Tumor (Spindle-cell Sarcoma) of the Left Ovary

III Calculous Pyonephrosis Following Pregnancy

By BROOKE M ANSPACH, M D

Professor of Gynecology, Jefferson Medical College, Philadelphia

I CHORIO-EPITHELIOMA FOLLOWING HYDATIDIFORM MOLE

CHORIO-EPITHELIOMA is a malignant disease with several unusual features. The underlying cellular activity that produces the chorion cancer is apparently but a continuation of the normal proliferation and penetration of the chorion cells during early pregnancy. From this, results the difficulty in diagnosing chorio-epithelioma of the uterus by histologic examination of the uterine scrapings, the existence of actively proliferating chorion epithelium alone is not sufficient to establish the diagnosis. One must demonstrate the presence of an area of new growth in the uterine wall.

There must be in every case of chorio-epithelioma some reason for the continued and unlimited growth of the chorion epithelium. Normally, after the placenta has been formed, the penetration and the erosive action of the chorion cells is stopped, possibly by the formation of anti-bodies in the blood. Theoretically, it might be assumed that a lack of such anti-bodies is responsible for chorion cancer, or there may be some disease or alteration in the chorion cells making them especially virile and uncontrollable. As a matter of fact, we know that chorio-epithelioma of the uterus is preceded in 50 per cent. of cases by hydatidiform mole, the frequency of this association makes it imperative to watch every patient who has passed, or who has been delivered of, a mole, with unusual care lest the early symptoms of a developing chorio-epithelioma be overlooked.

There is an interesting relationship between these two diseases of the chorion and the compound theca-lutein cysts of the ovary. These cysts, which vary in size from an egg to a grape fruit, are observed often enough to constitute one of the usual findings and hence assume diagnostic importance. Various speculative theories

as to their origin have been advanced. Whether over-activity of the chorion epithelium produces an excess of lutein tissue with subsequent cyst formation, or whether over-activity of the lutein tissue governs the overgrowth and degeneration of the chorion villi, remains to be answered, they have been observed to undergo retrogression after the removal of the intra-uterine mole formation.

The case of chorio-epithelioma following hydatidiform mole, herewith reported, presented many of these features of interest and is given below in detail.

Patient, aged twenty-one, seen first four months after marriage, complaining of dyspareunia, the vaginal orifice was narrow and tender, the uterus was in retroflexio version and descensus. A median perineotomy was done with plastic repair, the uterus was replaced and supported with a Smith pessary.

Periods were regular until November, 1925, the period due about the 26th of that month did not come on, by the second week in December the early symptoms of pregnancy were well marked. Nausea was especially troublesome, and in spite of the usual remedies and regulation of diet, etc., gradually increased. At the beginning of January, 1926, there was a little bleeding with pain, pelvic examination showed the uterus normally enlarged and in good position. In spite of confinement to bed, the symptoms continued, the general condition showed progressive decline, especially evidenced by an anæmia which steadily increased. On the 26th of January, an abortion appearing inevitable, the patient was given an anæsthetic for the purpose of emptying the uterus. Pelvic examination then showed a cystic enlargement of both ovaries, the right one free above the pelvic brim, the left one adherent in the pouch of Douglas. The patient had been unusually sensitive and difficult to examine without anæsthesia, but the condition of affairs was presumably so well known that no thorough examination had been made after the bleeding started. The usual plan for emptying the uterus of course was abandoned, abdominal hysterotomy was determined upon and at once carried out. The ovaries presented a striking appearance. The right ovary was as large as an orange and entirely free of adhesions, the ovarian tissue itself was hypertrophied, had a yellowish white color and made up the cyst wall toward the hilum, elsewhere the cyst wall was thin, evidently nothing more than the distended ovarian capsule through which the port-wine color of the fluid contents could be distinguished. The left ovary was smaller than the right, about the size of an apple, exhibiting the same cystic changes as the right but adherent in Douglas's pouch. Rupture occurred when an attempt was made to free the adhesions and bring it up out of the pelvis.

Hysterotomy revealed an hydatidiform mole. The amniotic sac contained about three ounces of thin, blood-tinged fluid and there were innumerable small grape like bodies characteristic of cystic degeneration of the chorion villi. There was no evidence of a fœtus, the mole was carefully separated from the uterine wall which was at all points examined for evidences of penetration of the myometrium or other indications of a beginning chorio-epithelioma. None were found. The uterine incision was closed with catgut, the left ovary and tube were removed. During the operation a blood transfusion (420 c.c.) was given by

Dr Harold Jones The patient had a stormy convalescence (bilateral bronchopneumonia) but was discharged at the end of three weeks in tolerably good condition

Histologic examination of the mole showed the characteristic picture of that condition but there were no indications of unusual activity of the chorion epithellum or any other evidences of malignancy

On her first visit to my office on February 25, 1926, notes were made as follows "The general condition of the patient has gradually improved, the enlargement of the ovary on the right side is no longer detectable, the patient has gained seven pounds, the uterus has involuted normally There was at first a chocolate-colored discharge, then on one occasion a little bright blood, then more of the chocolate colored discharge, which has now ceased"

She returned on March 31st. Her general health was good, there had been a gain of thirteen pounds since the previous visit, she reported a chocolate colored discharge from March 7th to March 16th, then nothing until March 27th, when there was a repetition of the discharge for a few hours She began to menstruate freely about two days later and had normal pains. After two weeks the bleeding had not entirely stopped The uterus was retroverted and regularly enlarged (subinvolution), it was replaced and supported with a pessary, twenty four hours subsequently the patient passed a large blood-clot and then the discharge gradually and progressively subsided.

By the 20th of April the uterus was normal in size and the only indication of trouble was a streak of blood in the cervical mucus The patient had continued to gain, her total increase being then sixteen pounds Nevertheless a diagnostic curettage was advised and practised on April 22nd The uterine cavity was normal in size, there were some shreds of tissue suggestive of retained decidual or chorial products, but there was no evidence of tumor formation Histologic examination of the tissue removed showed small bits of tissue of chorionic origin exhibiting active cell division "While the picture is extremely suggestive of chorion carcinoma," said the pathologist, Dr Bowman Crowell, "a diagnosis of that condition cannot be made with certainty on the histologic appearance alone."

The patient was kept under close observation She felt exceedingly well and there was nothing but a slight colorless discharge from the uterus—no blood Chorion cancer was of course strongly suspected but as there was histologic evidence only and no recognizable tumor, the diagnosis was regarded as tentative and a policy of watchful waiting was adopted. This seemed the more judicious plan inasmuch as a complete removal of the uterus and of the remaining ovary was of such vital moment to this young woman who was so desirous of motherhood

There was no appreciable change in the size of the uterus by the 30th of April and there had been no bleeding On May 2d and 3d there was slight blood loss and on examination on May 4th there was definite enlargement and irregularity of the uterus on the right side There seemed now to be no reasonable doubt relative to the diagnosis and an operation was determined upon At this time the patient suddenly developed a coryza and although there was no involvement of the lungs, in view of the serious post-operative pulmonary complications after the removal of the mole, the operation was deferred until

all traces of the nasal infection had disappeared. On May 14th there was a sharp hemorrhage, in the middle of the night, which required a vaginal pack.

On May 16th, a complete hysterectomy was done with right salpingo-oophorectomy and appendicectomy. Upon exposing the pelvic organs, one was at once struck with the normal appearance of the right ovary, there was no evidence of the previous cystic enlargement, the ovary had shrunk below its normal size. A nodular enlargement, the size of a walnut, was plainly visible in the wall of the uterus on the right side. The vessels on this side of the pelvis were ligated as near to the pelvic wall as possible because the tumor had grown close to the right lateral border of the uterus and invasion of the vessels of the broad ligament was already a possibility (Fig 1, frontispiece.)

The patient made a good recovery and remains in good health. With the continuous use of desiccated ovaries there have been no symptoms of an artificial menopause.

I have reported this case in detail to bring out some of the difficulties in the diagnosis and the treatment of hydatidiform mole and of chorio-epithelioma. The specimen presented an interesting study. The new growth had evidently begun within the inner layers of the myometrium, as it increased in size, it had advanced well out toward the broad ligament, but there was a rim of uninvolved muscularis between it and the broad ligament, and there was no invasion of the latter. The endometrial surface of the growth was unbroken except for a linear rift in the midline. One was inclined to believe that the sudden and severe bleeding just preceding the operation had been occasioned by this solution of continuity in the endometrial surface of the growth.

II ACUTE TORSION OF A SOLID TUMOR OF THE OVARY

Acute torsion of an ovarian tumor is not infrequent and the tumor is usually cystic. This is explained partly because cystic enlargement of the ovary is so much more common than solid, and partly by the fact that solid growths (papillomata, carcinomata, etc.) are more likely to become attached at an early stage to the surrounding peritoneum. One of the striking features of acute torsion of an ovarian cyst is the absence of pelvic symptoms up to the onset of the pain, the smooth rounded tumor gradually displacing the intestines, riding freely out of the pelvis, and producing no discomfort whatever.

The solid tumors of the ovary that may be said to be predisposed to torsion are those in which the capsule of the ovary is smooth and there is no surface proliferation that attaches the tumor to the sur-

rounding structures. Such are the fibromata, the myofibromata and the spindle-cell sarcomata.

The immediate cause of the twisting of an ovarian pedicle is often some sudden unusual exertion of the patient which abruptly increases the intraabdominal pressure and rotates the tumor. This may be heavy lifting, straining at stool, cranking an automobile, a stroke at golf, etc. It is probable that in a majority of cases some twisting of the pedicle has already begun at the moment the sudden additional force comes into play, in the case reported here, the details of which follow, the attack was precipitated by calisthenic exercises.

Mrs. W., aged thirty seven, mother of three children, had two miscarriages before the first labor, there were two labors, the second one twin. Menses began at the age of thirteen, thirty to thirty-one day type, lasting two or three days, the flow was normal, there was slight pain. After the second labor (at the age of thirty four) the periods were irregular, occurring every three weeks to two months, the duration and the amount of flow were the same and there was no pain. She had just finished an uneventful period at the time of her attack. The patient's previous history was uneventful and her general health had been excellent preceding the attack, occasionally, when fatigued, her back would hurt but there were no other abdominal or pelvic symptoms.

The pain began early in the morning after her "daily dozen." It came on acutely, was sharp, cutting, very severe and accompanied with nausea and vomiting. An enema gave some relief for a half hour but the pain then became progressively worse and agonizing. The diagnosis was not hard to make, the temperature was normal, the pulse was a little accelerated, the blood pressure was very slightly reduced, the blood count showed no evidence of either hemorrhage or infection, a pelvic tumor, exquisitely tender, could be felt by abdominal palpation above Poupart's ligament on the left side. Pelvic examination confirmed the abdominal findings. The tumor lying at the pelvic brim, the uterus being displaced to the right and anteriorly. Operation disclosed a solid tumor of the left ovary, 10 cm. in its largest diameter. There were two complete twists of the pedicle which included the tube, there was hemorrhagic infiltration and edema of the tube which was swollen to the size of a carrot. The left tube and ovary were removed, the stumps were peritonealized with a posterior fixation of the left round ligament, on the right side the round ligament was shortened by the Baldy Webster plan. There was an uneventful recovery. (Fig 2, frontispiece.)

III CALCULOUS PYONEPHROSIS FOLLOWING PREGNANCY WITH SYMPTOMS OF POST-PNEUMONIC PYELITIS PRECEDING PREGNANCY

For a complete kidney study, X-ray pictures are essential, otherwise there is always the possibility of overlooking a calculus. The case herewith detailed possibly shows the disastrous consequences of such an oversight.

The complaint of the patient at the beginning of her urinary symptoms did not suggest a kidney stone. The relation of the onset of the symptoms to a previous illness and the results of one ureteral catheterization and examination of the ureteral specimens, seemed to indicate clearly a post-pneumonic pyelitis and cystitis. Cultures from the affected kidney were negative. A guinea-pig inoculation showed no evidence of tuberculosis. The bladder and the kidney symptoms subsided promptly, although the purulent content of the urine continued as before. The patient was loath to have the ureteral catheterization repeated inasmuch as the first one had been followed with a marked febrile reaction (103° F) and severe pain. The plan of further ureteral treatment being temporarily abandoned, she was given a urinary antiseptic, hexylresorcinol. When she reappeared for advice she was pregnant. The obstetrician, into whose hands she was placed, found nothing unusual in her kidney function, etc., during pregnancy and delivered her at term of a healthy male child. Pain in the kidney, a kidney or ureteral crisis, occurred first when the baby was three months old. After catheterization and irrigation of the kidney had failed to relieve her, an X-ray picture was made and a stone found in the kidney pelvis. The usual kidney studies were made. The right kidney was apparently functionless, the urine from that side was loaded with pus-cells, the function of the left kidney was within normal bounds as was the total kidney function. Such extensive involvement of the kidney was found at operation that nephrectomy was imperative. The position of the kidney stone and the history of the case point quite clearly to the probability that if at the time of the first urinary symptoms, an X-ray picture had been taken, the stone would have been discovered. Its prompt removal might have prevented further kidney pathology. The details follow.

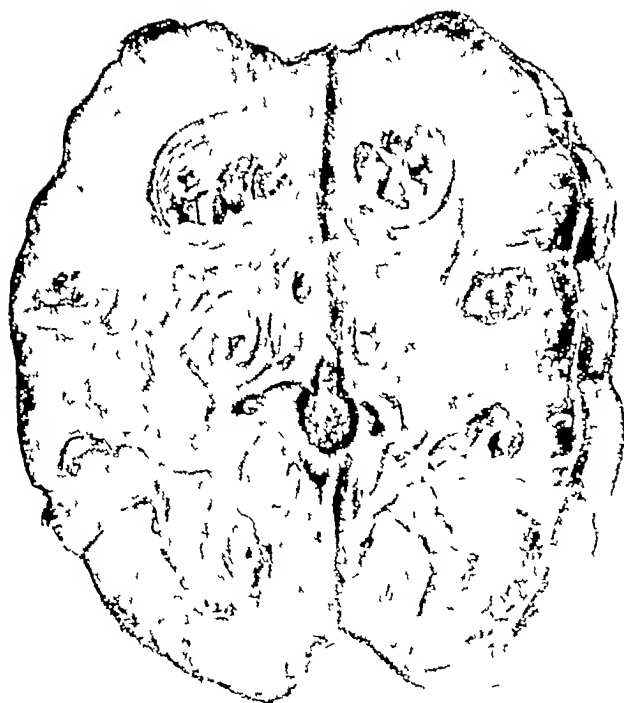
Mrs. H., aged twenty-four, married thirteen months, no pregnancies. First consultation May 25, 1925. Patient had suffered with streptococcus pneumonia a month before and the urinary symptoms, frequency and pain at the end of urination, had developed during her convalescence. Catheterized specimens of urine were loaded with pus. Cystoscopic examination showed a diffuse inflammation of the bladder mucosa, both ureteral orifices appeared normal and were equally active, the urine did not appear abnormal as it was discharged from the ureters. After bladder irrigation had failed to reduce the evidences of cystitis, ureteral catheterization was done with the result already mentioned.

FIG 3



Calculous pyonephrosis
(Posterior external surface)

FIG 4



Calculous pyonephrosis showing stone at junction of kidney pelvis and ureter

The severe reaction and the pain on the right side, in view of the negative findings in the urine from that kidney, suggested the possibility of a secondary infection as the result of ureteral catheterization. Cultures from the bladder had shown the staphylococcus. The pain and discomfort on the right side rapidly subsided and a repetition of the ureteral examination was not urged. Pregnancy soon followed, no urinary symptoms of any consequence being observed during pregnancy, and it was not until three months later that ureteral and kidney pain drew attention to the right kidney.

Nephrectomy was successfully performed September 30, 1926, and the patient is now in good health. At the last examination of a catheterized specimen of urine on November 2, 1926, there were still from eight to ten pus-cells to a high power field (Figs. 3 and 4).

THORACOPLASTY *

By PROFESSOR SAUERBRUCH, M D

Director of the Surgical Clinic, University of Munich, Munich, Germany

THIS morning I am going to demonstrate the method of operative treatment of pulmonary tuberculosis, and shall show its effect on a small group of persons, who have been so operated upon. A short sketch of the development of the treatment may interest you, and I will begin by drawing to your attention the attempts of Quincke and Spengler to solve the problem.

They thought that a certain percentage of diseased persons show a better healing tendency than do others and that, because of purely mechanical reasons, this capacity cannot be estimated. To-day we know that with diseases of the pleural cavity, fibrous adhesions are formed between the chest-wall and the lungs, with fixation of the lungs and interference with the healing process. In youth when the thorax is still elastic, a strong retraction of the chest-wall may take place under the traction and pull of the scar tissue formed in the healing stage of pulmonary tuberculosis. Yet even with the elastic thorax a collapse of the cavity with definite healing is a rare phenomenon. Whenever the chest-wall cannot follow the traction because of the rigidity of the ribs, the adhesions between the lungs and the chest-wall act as an obstacle to healing. The constant traction, exerted from the chest-wall through the adhesions on the cavity, often causes an impairment of the condition by stretching of the cavity-wall. Clear and unmistakable as were the conceptions of the pathological anatomy and the physiology of cavernous fibrotic phthisis, just as inappropriate, even though logical in conception, were the therapeutic means used for its cure. An incision was made over the cavernous area, and sections of one or more ribs were removed, thus effecting a narrowing and compression of the diseased region.

Unfortunately the expectations based on this procedure were not realized. To-day the reason for this is known. The partial narrowing of the cavernous lung involves serious danger not only for its sound portion, but also for the opposite lung. The contents of the

*Address delivered before the Post graduate Assembly at Munich

cavity are squeezed out and aspirated into the non-affected portions of the lungs. Aspiration-pneumonia with fatal results was the rule. It so happened that this treatment premised upon sound anatomico-pathologico-physiologic fundamentals was sterile of results, and had to be abandoned. Later, the endeavor to influence pulmonary tuberculosis by operative treatment got a new impetus through the introduction of artificial pneumothorax. You are aware that the American Murphy as well as the Italian Forlanini, at nearly the same time, tried to cure tuberculous lungs by inflation of the pleural cavity with nitrogen. Their suggestion was based on clinical and pathological experience and the fact that in connection with effusion and spontaneous pyoneumothorax the progress of tuberculosis of the lung was controlled and healing soon begun. It was believed that the restriction of functions, that is the collapsing and fixation of the lung, had a favorable influence. To-day, we know that, in addition to this, other important factors play a rôle, namely, the mechanical diminution in size of purulent cavities, the adjustment of metabolic processes in the affected region and fundamental changes in the circulation of the blood in the same area.

The newly introduced pneumothorax therapy proved in course of time to be useful, but only partly fulfilled the expectations of those who used it. Influenced by the experience of the followers of this therapy, the long-forgotten Quincke-Spengler idea was revived and an attempt was made to create for it, in conformity with the pneumothorax therapy, a larger field of usefulness. The purpose was to produce the most extensive collapse of the affected lung. Wherever this proved impossible, an effect similar to pneumothorax was to be aimed at by rib-resection localized over the affected area. These conclusions were certainly based on logical deductions.

Therefore, in cases of cavernous phthisis, extensive rib-resection in the manner of the Schede operation was performed. This method, in the final results, however, did not prove successful. Although it led in the beginning to a surprising success, it had to be discontinued for the time, owing to a tremendously high mortality. With improvement in the technic, a new method was devised which greatly reduced the immediate danger for the patient, and which to-day may be considered as the standard, namely, *paravertebral resection of the ribs, from the first to the eleventh*. This method of operation with its

well-developed technic, in connection with the conduction anaesthesia, has, even though associated with great shock, reduced the dangers to such a great extent that the average mortality of 4 per cent has been reached.

Ladies and gentlemen, you will see for yourselves in what a comparatively short time this operation can be performed.¹ This hospital, the University Surgical Clinic of Munich, has had about nine hundred such cases, and you will be surprised to hear what remarkable success has been achieved in the treatment of pulmonary tuberculosis.

Taking for granted that only unilateral and fibrotic tuberculosis is selected for such a treatment and that the operation is expertly performed from a surgical point of view, healing may be obtained in from 60 to 70 per cent. of the patients. Another 20 to 30 per cent. may be considered improved and may be able to work in a moderate way. I want to lay stress upon the word "healing," that is to say, it should come up to all our expectations. We should demand, at least, that for three years the patient must be free from fever, in good condition, without expectoration, and that sputum be free from tubercle bacilli—only then are we entitled to speak of "healing." While in the beginning, on strictest indication for operative treatment, we had to confine the performance of thoracoplasty to unilateral fibrotic tuberculosis with cavitation, experience taught us to risk this successful treatment with caution, even if the disease had already spread to the other side. Indeed the difficulties of selection are rather great, but thorough observation and most discriminating balancing of "pros" and "cons" can prevent one from making a mistake. In this difficult decision, phrenicotomy, namely, the artificial paralysis of the diaphragm, such as was introduced by Sturtz and Sauerbruch in 1912, proves to be a sort of test operation.

Its object is to give rest to the lung and to compress it by the high arching of the diaphragm on the affected side. Our opinion, however, is that with this method only in exceptional cases can a good permanent result be obtained. However, it is an effective aid to extrapleural thoracoplasty.

¹ Professor Sauerbrook performed on a patient who has previously been anesthetized, the complete thoracoplasty, removing sections of the first to eleventh ribs, in the remarkably short period of eighteen minutes from the time the first incision was made until the patient was on the cot leaving the room.

A third method may be applied in cases of tuberculosis with cavitation, *i. e.*, paraffine filling. Tuffier first tried this method, and it was generally used according to Baer's suggestions. The method comprises absolute compression of the diseased pulmonary tissue by means of paraffine.

The results are less encouraging than in thoracoplasty. But in isolated instances, even this method has brought about surprising improvements in the patient's condition.

In conclusion, I desire to state that the surgical treatment of certain forms of unilateral pulmonary tuberculosis has made considerable progress in combating this widespread scourge. And perhaps I may also state that it represents practically the most significant advance of surgery in the last twenty years. I hope to convince you by the following demonstrations that these statements are correct.

OPERATION BY PROFESSOR SAUERBRUCH AND HIS ASSISTANTS

CASE I—*Extrapleural Thoracoplasty*—The patient, aged twenty five years, had pulmonary tuberculosis with shrinkage of the right upper and middle lobes and with cavity in the upper lobe. The disease began in 1919 with apical catarrh. In 1924 there was repeated hemoptysis. In May, 1925, attempt at pneumothorax was twice made with negative results. Repeated sanatorium treatment resulted in but slight improvement. Sputum, to the amount of 10-20 c.c., was expectorated daily. As further improvement is not likely to take place after another sanatorium treatment, the possibility of further shrinkage and obliteration of the cavity is offered only by operative compression of the lung.

Operation—Conduction anesthesia is first performed by an assistant before the patient is brought into the operating room. The patient is wheeled into the amphitheatre in his own bed and then is transferred from his bed to the operating table. He is placed on the table in a semi sitting position and is rotated so that the affected side is uppermost.

The area of operation is then prepared and field covers are applied. An incision is now made, extending from the first rib to the eleventh. The incision is curved with the convexity toward the vertebra. The incision at its midpoint comes within about three inches of the spine of the vertebra, and extends down through the muscles to the ribs. Bleeding vessels are caught and tied. After freeing the periosteum from the ribs, the ribs are sectioned—from the first to the eleventh—the largest piece, about three inches long, being removed from the sixth rib. (Special instruments are used, since with the ordinary rib resector it is impossible to remove a section of the first rib.) Bleeding vessels are caught and ligated. A large drainage tube is inserted along the bed of the incision, coming out at the lower angle. Muscles are approximated. The skin is closed.

Voluminous dressings are applied and held in place by adhesive strapping. These straps consist of two pieces of adhesive two inches wide, between which a strong piece of elastic webbing is sewn. This webbing lies over the dressings.

and is stretched while being applied, so that constant pressure is exerted over the side operated upon with forcible compression of the chest wall

The patient is placed in semi sitting position in bed.

There is considerable shock after such an operation. The temperature is elevated, pulse and respiration are increased for several days. At first the sputum is increased in amount and then gradually diminishes. An accurate record of the quantity of sputum is kept.

As soon as suitable after operation, the patient is transferred to a sanatorium, where the usual methods of pulmonary therapy are carried out.

DEMONSTRATION OF CASES ALREADY OPERATED UPON

CASE II—One stage, Recent Thoracoplasty. The patient, aged twenty seven years, with a pulmonary fibrotic tuberculosis with cavitation of the right side and active lesions of lower lobe of left side, was admitted on May 8, 1926. Sputum, 60-80 c.c. daily, bacilli numerous. At operation on May 19, 1926, the first to tenth ribs were resected. Average amount of sputum after operation was 40-50 c.c.

CASE III—Two-stage Thoracoplasty, recently done. The patient, aged twenty five, had pulmonary fibrotic tuberculosis of left side with cavitation. The onset of disease was noted in July, 1924. Sanatorium treatment resulted in slight improvement. At time of admission, April 22, 1926, the sputum was 20-30 c.c. daily. The bacilli were limited in number. On April 30, 1926, at the first operation, the ribs from the eleventh to the sixth were resected. May 26, 1926, at a second operation, the sixth to the first ribs were resected.

CASE IV—One stage Thoracoplasty, five years ago. The patient, twenty-seven years of age, had pulmonary fibrotic tuberculosis with shrinkage and cavitation of the left lung. The disease was first noted in October, 1917. Sanatorium and pneumothorax treatment were tried, in 1920 pneumothorax treatment was abandoned on account of extensive adhesions. The patient became worse. On January 24, 1921, he was admitted to the clinic. The amount of sputum was 20-30 c.c. daily. Bacilli were present. There was no fever. On May 2, 1921, a one stage thoracoplasty (first to eleventh ribs) was performed. The patient was discharged May 19, 1921. The amount of sputum had decreased to 5 c.c. The weight had increased 15 kg. The patient has worked again since December, 1921.

CASE V—Two stage Thoracoplasty, seven and six months ago. An official, aged twenty nine years, with pulmonary fibrotic tuberculosis with shrinkage and cavitation of left side, beginning in 1919. Pneumothorax and sanatorium treatment brought no improvement. In 1924 pneumothorax was abandoned. November 9, 1925, the patient was admitted to clinic, sputum 10-20 c.c., bacilli many. November 25, 1925, at the first operation the eleventh to seventh ribs were resected. Advance of process on the same side ensued. December 19, 1925, a second operation (first to sixth ribs) was done. January 1, 1926, the patient was discharged in good condition, sputum 1-2 c.c., bacilli diminished in number.

CASE VI—Two-stage Thoracoplasty, three and two months ago. The patient was a teacher, aged thirty years, with pulmonary fibrotic tuberculosis with shrinkage and cavitation of right side. The onset of disease was in 1920. Repeated sanatorium treatment was given, and in 1924 phrenectomy was performed. At time of admission to clinic the sputum amounted to 10-20 c.c. Bacilli were numerous. March 12, 1926, the first operation (eleventh to seventh

ribs) was done April 7, 1926, a second operation (first to sixth ribs) was performed. The sputum decreased to 1-2 c.c. Bacilli were limited in number. The patient was in good condition.

CASE VII—Paraffine Filling, five weeks ago. The patient, a manager, aged forty-one, had pulmonary fibrotic tuberculosis with shrinkage and cavitation of right upper lobe. There was no other clinical signs. The amount of sputum was 20-30 c.c., bacilli were numerous. April 28, 1926, paraffine filling, 200 c.c., was introduced over the affected area. The sputum decreased to 10-20 c.c., the bacilli diminished in number, and the patient was in good condition.

CASE VIII—Paraffine Filling, five and a half months ago. In a patient, aged thirty-six years, with pulmonary fibrotic tuberculosis with shrinkage and cavitation of right upper lobe and limited active exudative lesions of the other side. The onset of disease began in 1911. Repeated sanatorium treatment was without avail. January 1, 1926, the patient was admitted to the clinic. The sputum varied from 20-40 c.c. daily, bacilli were limited in number. January 15, 1926, paraffine filling, 220 c.c., was introduced. February 16, 1926, the discharge of sputum had decreased to 10 c.c., and was negative for bacilli.

CASE IX—Pneumothorax empyema. Ruptured into Lung (Tuberculosis). In a patient, aged twenty-eight years, the onset of disease began in 1921. There was left-sided pulmonary tuberculosis, which was treated by pneumothorax in 1923-1924. In April, 1925, exudate ruptured into the lung. When admitted to the clinic the patient weighed 42 kg. Bülow drainage was instituted. June 6, 1925, upper extrapleural plasty (first to seventh) was performed, followed June 26, 1925, by lower extrapleural plasty. This was followed by sanatorium treatment. January 26, 1926, rest cavity operation was performed. May 23, 1926, the patient was discharged with the wound healed, weight 45.5 kg., sputum 5-10 c.c., and negative for tubercle bacilli.

A study of the above cases will show the remarkable results of operative therapy in pulmonary tuberculosis.

TYPES OF ANAL AND RECTAL CANCER

By CHARLES J. DRUECK, M.D., F.A.C.S.

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Five different histologic types of cancer are found at the anus or within the pelvic bowel, and, especially in its terminal stages, each produces some distressing condition peculiar to its type. These several kinds of cancer are (1) Epithelioma, (2) melanoma, (3) encephaloid carcinoma, (4) scirrhus carcinoma, (5) sarcoma.

Lynch¹ tabulates 491 cases seen by him and reports

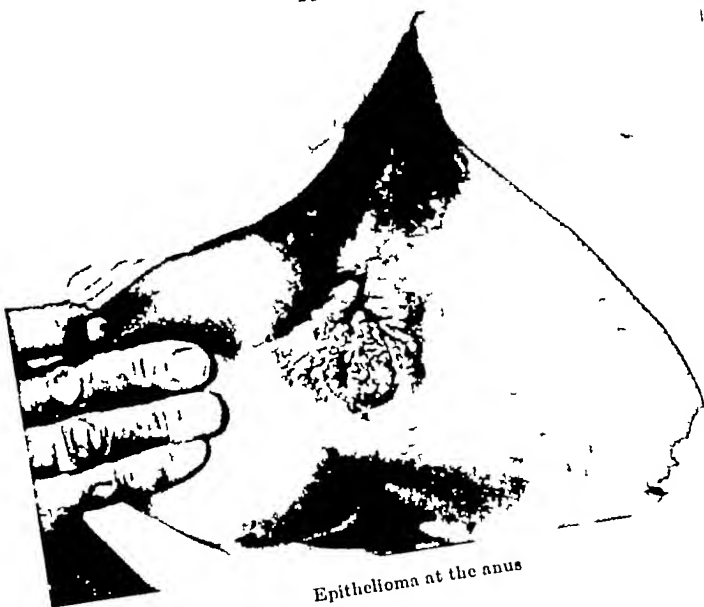
Males	281
Females	210
Nature of disease	
Adenocarcinoma	451
Epithelioma	15
Colloid carcinoma	4
Scirrhus carcinoma	5
Round cell sarcoma	5
Melanosarcoma	5
Lymphosarcoma	4
Spindle-cell sarcoma	3

All of these may become cystic, myxomatous, colloid or ulcerated to such an extent as to greatly change their macroscopic and microscopic appearance. In their order of malignancy the melanotic is the most fatal, then the encephaloid, next the epithelioma and least of all the scirrhus growth.

EPITHELIOMA

At the anus, squamous or pavement-cell epithelioma is the rule and is the same form of cancer as is so commonly seen on the lip (Figs 1 and 2). It originates in a preexisting fissure, ulcer, cicatrix, mole, wart, keratosis or chronic irritation and never on a normal uninjured anus. The tumor begins as a hard, warty nodule, just under the skin at the mucocutaneous border and not within the anus. This deviation from the normal makes slow progress. For a long while nothing is noticed but the little scales which are repeatedly picked off as often as they appear, beneath these crusts or scales

FIG 1



Epithelioma at the anus

FIG 2



Advanced epithelioma of the anus which has destroyed the entire recto-vaginal septum

exists the ulceration and induration which is greater as each succeeding scab is removed. Sometimes several distinct nodules are found about the anus. There is little or no tendency for the mass to extend into the rectum or into the outlying skin. It makes slow progress and does not ulcerate until late in its existence. From the ulcer there exudates a watery secretion.

This early precancerous stage is when the growth is most easily remediable, but it is astonishing how frequently both physicians and patient pay no attention to these conditions. If every anal irritation were removed these epitheliomata would be very rare if they occurred at all.

During the nodular stage of the cancer growth, there is no pain and also as the growth invades the perineum it is not sharply painful. Most patients speak rather of an uncomfortable feeling or a soreness. If the anus is eroded (which, however, is rare), the pain is similar to irritable ulcer or fissure and begins as early as the growth pushes through the mucous membrane.

The cancerous ulcer bleeds or oozes blood easily by abrasions of the passing feces, but the hemorrhage is usually slight. Epithelioma is distinguished from rodent ulcer by its nodular raised base covered with granulations. Microscopically there are found the characteristic nests of squamous epithelium which invade the lymph spaces from the surface. The stroma is made up of fibrous and myxomatous tissue and is pretty well supplied with blood-vessels and inflammatory corpuscles.

Having seen the clinical picture of cancer at the anus let us differentiate it from other ulcerations of this region.

(1) The lupoid ulcer begins at the same point, but the ulcer is clear cut and bands of cicatrization develop. These bands break down shortly after they form, but other scars form and clinically we usually find some of these bands. The ulcer spreads rapidly and sometimes involves the whole buttock. The edges of the ulcers are not thickened. The base of the ulcer is soft, but beneath it is a hard indurated mass. Examination of scrapings will usually show tubercular bacilli.

(2) The plain tuberculous ulcerations differ from the lupoid in that they first appear as anal fissures. They may be single or multiple, but as they spread they soon coalesce into one large ulcer. They are not painful. About the base of the ulcer is a dense fibrous layer.

which seems to limit the depth and so the ulcer may surround the anus without reaching the connective tissue beneath the skin. It is a singular fact that any dense scar will act as a barrier to the spread of the ulcer, probably because of the lack of blood-vessels.

(3) Simple traumatic ulcers at the anal margin differ somewhat from similar ulcers on other parts of the body because numerous bacteria habitats of the intestinal canal abound in the skin of these parts. The ulcers are irregular in outline, with red, but usually sharp, flat edges which slope down to the base of the ulcer. The base is crater-shaped with many granulations, and generally is freely discharging pus. This pus is foul smelling because of the many sudoriferous glands about these parts. The granulations bleed easily on wiping. The pain on defecation may be slight, but is not acute.

(4) Eczema about the anus is rarely of the papular type, but is usually the erythematous form. In chronic cases the skin becomes dry and brittle and cracks on stretching. Beneath the eczema the skin is indurated but the hardening is in the skin and not beneath as in cancer. The whole trouble is in the skin and moves with it. The ulcers, if present, are shallow.

(5) Rodent ulcer. The edges of rodent ulcer are hard and well defined. The ulcer begins in the skin and grows deeper and has few granulations. It begins on the skin about the anus, but not at the mucocutaneous border as does cancer. The induration about the base of the ulcer is only moderate in amount in contrast to the wide induration about cancer.

(6) Irritable ulcer or fissure. The cardinal sign of irritable ulcer is the sharp lancinating pain at stool. The ulcer is located in and conforms to the shape of a fold in the anal mucosa. It extends up to sphincter grasp. It is shallow and the edges are inflamed, sometimes even thickened, but never indurated. If there is a tumor associated with the ulcer it is most likely the sentinel pile or the ruptured crypt of Morgagni.

(7) Warts. These may appear at the anal margin, but have no indurated base. Ulceration of the warts occurs but rarely and then usually in dirty subjects only.

(8) Chancres. The most common site of the chancres is in the skin just outside of the anal folds and the ulcer resembles chancres elsewhere. It is superficial and circular in outline, but the indura-

tion at the base does not extend beyond the edges. The border of the wound is red, but the centre is dark gray. Chancres here are not painful.

MELANOMA OF THE RECTUM

Melanotic cancer of the rectum is rare, although the literature on the subject of melanoma is being constantly augmented. Its histologic relationship is not clear and is classed as a carcinoma by certain pathologists, as a sarcoma by others. Ewing evades the question by saying, "The theoretical considerations favor the origin of all melanomas from the mesoblastic chromatophores while the histology of human tumors favors the origin from epithelial cells which have taken on pigmentary functions." Choler and Bonnett,² who have studied the subject exhaustively, say these melanotic tumors of the rectum are anorectal epithelioma of the malpighian type, that they are ectodermal and arise in the anal region at the expense of the malpighian epithelium.

Whatever the histological peculiarities, it interests us clinically that melanomas are the most malignant of cancers within this region. They originate in the anorectal region, lower rectum or anal canal rather than within the rectal ampulla. They may be single or multiple, flat or pedunculated, but do not materially constrict the lumen of the bowel. These are skin tumors primarily and later involve the mucosa. The mucosa is movable upon the deeper structures and is uninvaded. The perirectal tissue is invaded early. The neoplasm grows with great rapidity and spreads its metastases by way of the blood-stream with extraordinary effect, producing secondary growths in great numbers in distant organs. The sacro-coccygeal glands are sometimes and the inguinal glands are usually involved, although this glandular involvement is often unilateral. Neighboring pelvic organs, the sacrum, bladder or vagina, are spared, but the liver and peritoneum involvement was noted in 80 per cent of the cases and the brain, lungs and other organs in 50 per cent.

The widespread metastases are an important feature of this disease. Ulceration or stenosis of the bowel does not occur and the sufferer should be spared the added burden of an intestinal resection.

Churchman,³ in 1918, made an exhaustive search of the literature for a study of reported cases. At the end of this chapter will be

found his list of 68 cases of anorectal melanomas to which we have added two more since reported

CANCERS WITHIN THE RECTUM

Within the rectum the diagnosis of malignant tumors is more perplexing. I have seen a distended urinary bladder and again a mass of impacted feces set a medical man worrying about a rectal tumor. These cases were both, of course, easily cleared up under their own appropriate treatment, but there are many cases that are not so easily diagnosed.

The cancer here belongs to the columnar cell growths and resembles the histologic structures of the mucous membrane from which they grow. They are adenocarcinoma and closely resemble the benign adenoma, but the glandular hyperplasia of the simple adenoma is restricted to the mucous membrane and grows up into the lumen of the bowel, while the carcinoma infiltrates the submucous tissues and spreads out in all directions. Microscopically, the resemblance between the groups of cancer-cells and the tubules of the normal gland is so great that the tumor may be mistaken for a benign adenoma, but in the margin of the growth quite atypical cells will be found.

These growths may arise in the cylindrical cells which line the crypts of Lieberkuhn and without any change in structure pierce the deeper layers of the rectum and produce metastasis. Microscopical section of such a tumor does not determine its character as to benignancy. Although these growths may be benign at the start, the cylinder cells very soon proliferate in some part of the mass forming solid strings of cells. The goblet cells then disappear. However, not all adenomata here are benign at first. Sometimes the cells become polymorphous and fill up the alveolar spaces and we have an alveolar carcinoma. The farther the cancer tissue is removed histologically from the normal, the more malignant it is.

These cancers arise above the sphincter and are easily differentiated from the squamous variety. Early in its existence the growth may appear pedunculated and clinically it is impossible to distinguish from simple adenoma until the tendency toward a broad infiltrating base shows the malignancy. Later, ulceration occurs and

FIG 3



Encephaloid cancer of the rectum. Note the soft masses extending out into the lumen of the bowel.

Fig 4



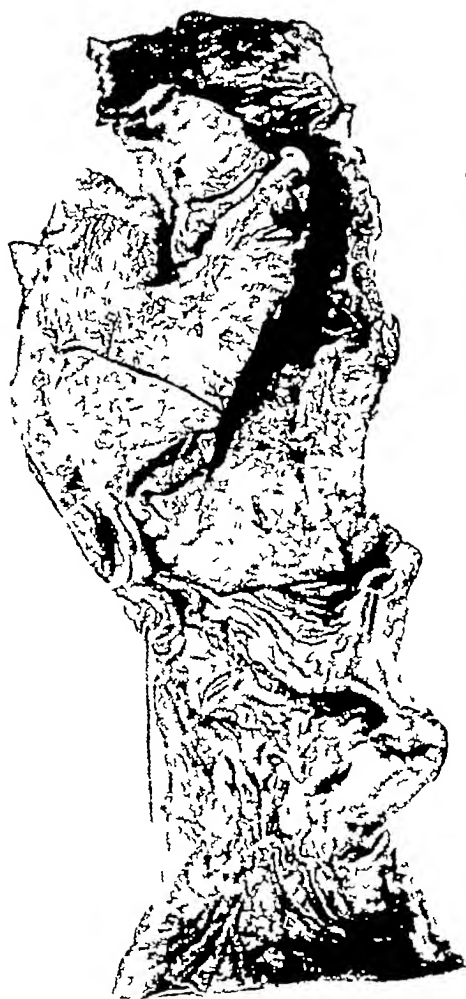
Adenocarcinoma undergoing ulceration

FIG 5



Ulcerated carcinoma of the rectum

FIG 6



Advanced scirrhus carcinoma of the rectum Canal is almost obstructed

inflammatory changes are superimposed, all being aggravated by the irritation of the fæces. The cancer varies somewhat in gross and microscopical appearance and also in a clinical history, according to the histological structure which predominates in the make-up of the growth. Thus, although the same elements are used, we find encephaloid, scirrhus or melanotic cancer.

ENCEPHALOID CARCINOMA

The encephaloid cancer (Fig 3) arises primarily in the crypts of Lieberkuhn and is enclosed in the connective-tissue capsule which sends trabeculæ into the mass, dividing it into lobules. The cells are large, round and nucleated. It is often vascular with large veins coursing through it and on its surface. In the interior, extravasations of blood give the tumor a soft, mushy feel and it resembles brain-tissue in appearance. Hence, its name encephaloid. In other instances it is spongy and shreddy like placenta. Later a large amount of cancer juice containing cells exudes on pressure, and if dropped into water it quickly diffuses, giving the whole a milky appearance. Paget considers this a valuable rough test in diagnosis. If seen early, the cancer is movable in the subjacent tissues, but when seen later, it is soft and friable upon an indurated base. These cancers grow rapidly and may fill the whole pelvis involving the surrounding tissues while secondary growths appear in neighboring organs. The glands are involved early, and if the tumor is removed it soon recurs, although considerable temporary relief is obtained by its removal and the cachexia disappears for a time. Digital examination is deceptive because of the extreme softness of the tumor and the apparent fluctuation imparted, but a little fluid aspirated will clear all doubt by showing cancer-cells and blood. As the deeper structures degenerate they become cystic with a mucoid glue-like, translucent, yellow substance, which distends the tissues, and the growth is called alveolar or colloid cancer. Generally speaking it may be said that the softer the cancer mass, the more rapid its growth and the greater its malignancy. These encephaloid cancers are the most malignant of the rectal tumors and are so friable that they bleed on the slight traumatism of an ordinary examination (4 and 5).

SCIRRHUS CARCINOMA

True cancer or scirrhus is the slowest growing and also the most frequently met in the rectum. It arises in the subcutaneous connective tissues as a hard nodule beneath the normal mucous membrane and radiates out in various directions, but principally longitudinally up and down the rectum. These new extensions can sometimes be felt as hard bands or processes, claws, from which cancer receives its name (Fig 6). The cut tumor presents a cancer mass that is bluish-white and gristly with masses of fat and fatty tissue between the trabeculae extending out into the normal tissue. The centre of the mass is generally degenerated and if the tumor is cut the centre retracts, making a saucer-like appearance. This has been called the cancer-cup.

The scirrhus cancer is said to arise more frequently on the anterior wall of the rectum, near the prostate and infiltrates all surrounding tissues and eventually involves the bladder. A circular stricture or collar forms about the rectum and as the lumen of the bowel is closed, an intractable constipation appears. Complete obstruction of the rectum may occur and even rupture of the gut from fecal accumulations above the cancer has occurred. Blood-vessels and nerves appear to be crushed out of the tumor and there is very little hemorrhage or pain. Ulceration comes on late in the scirrhus cancer and there is very little absorption or toxæmia, the cachexia comes on late also.

The diagnosis of scirrhus cancer is made by its hardness and contractility, but its history is often necessary to differentiate it from simple fibrous stricture of the bowels. This latter may exist for years with no other symptom, perhaps, than the intractable constipation. Kelsey reports a case of dysenteric diarrhoea which resulted in a stricture and presented a typical clinical picture of scirrhus cancer, but had existed for eighteen years.

Histologically, the scirrhus cancer stroma is abundant and the alveoli narrow with the cancer-cells frequently small. Fatty degeneration of the cells often occurs, but the stroma remains to contract. Secondly, metastatic growths occur late and there is hope of a cure by early and thorough excision.

SARCOMA

Sarcomas of the rectum are quite rare, Durante⁴ tabulated thirty-one he found in the literature. Only 80 per cent. of the non-pigmented were operable, 14.2 per cent. have survived for three years. Of the sixty-six melanotic rectal sarcomas, 69 per cent. were operable, and 8.1 per cent. are known to have survived for three years after partial extirpation and 13.1 per cent. after more radical procedures. In his case the sarcoma was in the rectovaginal septum, close to the anus. The non-pigmented sarcomas are of slow growth and do not invade the lymphatics early, if at all. The woman, aged forty-eight, was in excellent condition when seen five months later.

Crescenzi⁵ also has written on this subject, and Dijkstra⁶ reports a case of sarcoma in the rectum and carcinoma in the gall-bladder in an elderly woman.

MULTIPLE PRIMARY CANCERS

Melchior⁷ recalls that cancerous stenosis of the intestines practically always has been explained by a cancerous growth in the bowel mucosa or secondary fibrous bands. The conditions were different in three cadavers recently examined, the rectal mucosa was intact and the stenosis was the result of a metastatic carcinomatous infiltration of the connective tissue around the rectum and encroaching on it. In one of the cases the conditions have compelled a laparotomy, and the patient, a previously healthy man of fifty-five, died. The primary cancer was a very small neoplasm in the œsophagus which had not caused any clinical symptoms at the time of death. The "periproctal cancer" and tendency to stenosis were a necropsy surprise in the second case—a woman of thirty-three with multiple metastases of a mammary cancer—and also in the third, a man of sixty-eight, with gastric cancer.

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THE INDEX CATALOGUE AND THE QUARTERLY CUMULATIVE INDEX MEDICUS AS AIDS TO THE CLINICIAN AND SURGEON *

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WHEN Colonel Billings' dreams of a great national medical library were being realized, he saw how limited its usefulness would be without a complete index to the literature it contained. There always had been kept an index of the books and pamphlets by title and author, but without an index to the individual articles of the periodical collection, the usefulness of the library would be limited. The very thought of indexing the material would have halted a less determined spirit, but Billings and his colleagues commenced the preparation of material for the *Index Catalogue*¹ in 1876 and the first volume was issued in 1880. Since that date, this work has run through two complete alphabetical series and the third series is about half completed. Within the covers of the forty-three volumes of the *Index Catalogue* so far published, there is listed the medical literature of the world since printing began. With the completion of the third series, it is proposed to change the form of the publication from an alphabetical serial to an annual, containing the literature of the preceding year, together with such accessions of earlier date as may have been acquired by the Army Medical Library during the year. The files of this library, which have furnished the material for the *Index Catalogue*, have also been used since 1879 by the compilers of the *Index Medicus*. This latter publication was started as a private venture by Colonel Billings and his assistant in the library, Dr Robert Fletcher. After passing through many financial vicissitudes and reorganizations, it was taken under the patronage of the Carnegie Institution in 1903, with Doctor Fletcher as editor-in-chief.

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¹ Index Catalogue of the Library of the Surgeon General's Office, U S Army

Since that time, the *Index Medicus* has always been edited by members of the staff of the Army Medical Library, in particular, Lt-Col F H Garrison, Maj A N Tasker, and Dr Albert Allemann. It is a quarterly bibliography of current literature and allied sciences.

In 1916, the American Medical Association inaugurated the *Quarterly Cumulative Index*, listing the contents of a limited number of high-class journals, devoted more exclusively to practical medicine than the exhaustive files of the Army Medical Library. With this comparatively limited, though still extensive, material and excellent printing facilities, the *Quarterly Cumulative Index* is a model of medical bibliography. Following negotiations extending over the past year, there has been reached an agreement for the fusion, under the auspices of the American Medical Association, of the *Index Medicus* and the *Quarterly Cumulative Index*. The consolidated publication will make its first appearance in April, 1927, under the name of *The Quarterly Cumulative Index Medicus*. As the two publications have been covering much the same field and neither has been entirely self-supporting, the consolidation is unquestionably a benefit to medical bibliography. The card-index of the Army Medical Library will furnish the material and provisional classification for the consolidated publication, while the redaction, ultimate arrangement, printing, proof-reading and distribution will be done in Chicago. Wherever the Library rubrics are not employed, they will be covered by appropriate cross-references as guide-posts.

The purpose of this article is to show those not already familiar with these publications how and where they may be consulted and how they can aid in the investigation of medical literature. The *Index Catalogue* is a government publication, issued without cost to libraries where there is need of its contents. These libraries pertain mainly to educational institutions and medical societies. Its distribution is world-wide, with the states of the Union well covered. The circulation of the *Index Medicus* and the *Quarterly Cumulative Index* follow similar lines, although they have wider distribution within this country. Every medical man should know where lies his easiest access to these publications. This information can always be obtained by a note to the Army Medical Library, or, for the new quarterly, by applying to the American Medical Association.

It is entirely superfluous to remind any medical teacher or

medical writer of his dependence upon an index of medical literature. It is a *sine qua non* to medical research of whatever character. Anything like an exhaustive survey of a medical topic without the aid of an index is as futile as the proverbial search for the needle in a haystack, and nobody can say that the literature of a subject has been fully covered until the three series of the *Index Catalogue* have been searched.

In medical bibliography, each of the publications mentioned above has a special value and a special use, and it is well to consider these seriatim if research workers are to get a maximum amount of assistance from them. The *Index Catalogue* lists books and pamphlets under author and subject headings and periodical articles under subject headings only. Here can be found an unrivaled array of literature upon any medical subject grouped under the appropriate subject headings and their subdivisions. The books and pamphlets of almost any medical writer can be found collected under his name, together with biographical data and even the location of his portrait. It is in the minute details of medical history that the *Index Catalogue* is especially valuable and for literature of all phases of this subject prior to 1880 it is practically the only source available. The *Index Catalogue*, as well as the two quarterlies, has an alphabetical arrangement throughout, thereby indexing itself. Its defect as a complete index is that while the literature covered by the latest alphabetical volume is well up to date, it is necessary to go back to the second series, *i e*, to references twenty years old for the literature of the next alphabetical subject. It will never be able to furnish current references as early after publication as will the *Quarterly Index*. The *Index Medicus* and the *Quarterly Cumulative Index* cover current literature, the former from 1880, the latter from 1916 to date. The former covers a wider range of literature in that its editors have selected the best material from the practically complete indexing of medical periodicals done in the Army Library, while the latter publication, by confining itself to a narrower field, has been able to give library assistants and practitioners a more handy and convenient index to medical literature of more practical intention. Both index themselves as to subjects, but the author index of the *Index Medicus* is a separate publication, while that of the Chicago quarterly is part of the total alphabetical arrangement (authors

and subjects) In the consolidated index will be retained the best features of the two parent publications, *i e*, it will index itself both as to authors and subjects

The usefulness of any medical index depends upon the adoption of a sound classification of subject titles and the best judgment in determining the captions under which articles should be placed Many titles practically index themselves, but a majority leave an option to the indexer, calling for consideration of two or more subject rubrics under which the article could be placed This may call for a scrutiny of the article to determine where the main interest lies, and even then different viewpoints would lead it to differing subject titles The happy solution of this situation is to index the article under all the captions which suggest themselves, and, in a measure, this course has been followed in the Chicago publication In the *Index Catalogue*, second and subsequent listings of the same article are done only when a single entry will not suffice Not only do many titles in the current literature fail to index themselves, but they give no clue to the contents of the article Imagine an article entitled "What Is the Answer?" which perhaps deals with the operative treatment of liver abscess. Here, the subject-matter is definite enough and easily classifiable, the fault lying entirely with the title But, only an Osler, an Allbutt, a Keen, or a Mayo can expect his article to be read if its title does not convey a clear idea of its contents, even though the indexer has listed it under what seems to him the most definite of captions

On the other hand, there is the misleading title which purports to give the contents of the article but which, upon examination, is found to stray far afield from this intention The bane of the indexer is the article dealing with a *mélange* of unrelated material, unclassifiable and, therefore, lost under a waste-basket heading

In recent years, medical research has developed wonderfully, and its literature is immense and bewildering In a survey of the journals devoted to such subjects as physiological chemistry, experimental medicine and biology, it is difficult, if not impossible, to arrive at an idea as to the purpose of the research, or the problem sought to be solved It would appear that much of the research is of purposeless character, with the hope that from the mass of facts thus accumulated, some useful deductions may be drawn An

example of the tendency in research is shown in the literature upon insulin. In that literature will be found the effects of all sorts of physical and chemical agents upon insulin, and likewise, the effect of insulin upon all manner of chemical substances and upon all organs of the body. Needless to say, the indexing of research literature is extremely difficult. The subject of biochemistry, for example, is so highly technical that its literature is bound to carry but a vague idea to the average indexer. Much of the literature of this character must, therefore, fall under very general headings.

The subject classification of the *Index Catalogue* is the product of nearly fifty years of expert indexing experience, and it is the basis for that adopted by the *Index Medicus*, modified for its special needs. In the adoption of subject rubrics, there is always to be considered the scientific name and the vernacular equivalent. The decision is based upon the heading under which the item would be sought by the clientèle of the *Catalogue*, which, it must be remembered, is thoroughly cosmopolitan. The name or names not adopted are, however, covered by cross-references to the one that is adopted. This classification is, of course, subject to constant changes and to frequent additions. The merit of the *Index Catalogue* classification lies in its conservatism, a classification that will withstand the vagaries of medical progress, and will be thoroughly understandable by the future medical historian of any tongue. For this reason, the classification already appears old-fashioned and sometimes verbose, but it cannot be denied literary quality and scientific accuracy.

The classification used by the *Quarterly Cumulative Index* tends to the adoption of the new term, whether it be the name of a proprietary drug, a diagnostic test, or a therapeutic procedure. Its rubrics follow the American vernacular to a large extent. The merit of this classification is that it groups the literature of the hour, and emphasizes the topics of current literature which fill the professional eye.

In the classification to be used in the consolidated *Quarterly*, an effort has been made to preserve the classical terminology without detracting from the practical value of the *Quarterly's* arrangement.

With the classification adopted as a frame-work upon which to construct the index, the problem of the indexer is to place the article in question under the rubric where it will be most likely sought by

the reader As explained above, this is difficult, and the results are never satisfactory to everybody As an example of the difficulties encountered, take the title "Epidemic Lymphadenitis with Formation of Abscess in Guinea Pigs Due to Infection with Hemolytic Streptococcus" The problem here is to determine whether the article would best fall under the caption "Lymph glands, diseases of, in animals," under "Animals, laboratory, diseases of," or under "Streptococcus, infections by" Relatively few titles offer three alternatives, but a large proportion can almost as well go to one subject title as to another

Those engaged in biographical research should remember, then, that few articles index themselves and that there is almost always more than one subject heading under which similar literature will fall A little thought will usually suggest the probable headings or a reference to one will usually show cross-references to the other

The indexer's viewpoint on medical literature cannot fail to be of interest and service to the medical writer There is some justice in current criticism of the subject-matter and titles of the American periodical literature of medicine The most common defect in the subject-matter is attempting too much, that is, the articles are too general in character An article with the general title "Malaria," covering the writer's experience with the disease, will attract no attention, whereas, had he emphasized the feature, whether the diagnosis, pathology or treatment, and given his article the definite title, he might have made an effective contribution to the literature of his subject Too many of these general articles, however, have no tendency and offer no excuse for their being The art of correct, terse composition is not easily acquired, nor is it to be generally expected However, anybody can draft an outline of what he proposes to say, and thereby give his article form and sequence, and there are few professional articles that are not susceptible of a brief résumé, or, at least, some conclusion Many readers of periodical literature turn first to the résumé, if any, and only read the article when the conclusions hold something of unusual interest A summary of contents, even in several languages, is a requirement for publication in many of the high-grade journals

An example of the meaningless title has been given above It is not a common fault Much more common is the too inclusive

title I have before me an article with the title "Pernicious Anæmia," with an excellent résumé, dealing exclusively with the diagnosis of that disease. Other examples of the too comprehensive title occur in the use of "Tuberculosis," when discussing only the pulmonary infection, "Malignancy," or "Malignant Disease" for cancer, or "Radiation" for the rontgen-ray or radium. A title concerning an "intracranial" lesion invariably calls for a search to determine which of the cranial contents is involved. More or less unsatisfactory are certain titles which result from a desire to employ unusual and picturesque terms, such as "Neoplastic Disease" for cancer, or, "Nephropathies" for definite kidney diseases. No doubt, "Acute Abdomen," "Interval Appendix," and "Prostatism" carry definite meaning to certain readers interested in these subjects, but these terms, and many others of like character, are literary atrocities that must open wide the foreign eye when not accustomed to American medical slang.

The use of eponyms should be kept to a minimum, although there are a few, like "Hodgkin's disease," "Addison's disease" and "Mickulicz's disease," which appear more satisfactory than any descriptive term yet proposed. Allbutt holds that these terms afford a convenient anchorage against any sea changes of medical doctrine. On the other hand, "Paget's disease" may refer to osteitis deformans, or to a precancerous lesion of the nipple, "Recklinghausen's disease" may be neurofibromatosis or osteitis fibrosa and "Wilson's disease" may be exfoliative dermatitis, or a degeneration of the lenticular nucleus. Much worse is the condition when eponyms are applied to surgical operations. Certain pioneer surgeons, like von Langenbeck, Dupuytren and Syme, are credited with having originated a dozen or more operations, each bearing his name, and these, in turn, have been modified by successive surgeons, and the modified operations are often given several times hyphenated eponyms.

It should be a duty of the medical editor to see that the title is descriptive of the contents, so that, to employ a commercial term, it will "sell" the article. Many high-class journals are blameless in this respect. Most titles are accepted without any question of change, while in the exceptional case, the editorial hand has made it the worse for interference. Here is an article which was

apparently given the title "Proper Prophylaxis in Focal Infection Is the Fundamental Concept for the General Physician." An awkward title to begin with, but subtitles were added as follows "Removal of the Focus of Infection Is the Most Important Measure When Systemic Disease Has Developed" and "More than one focus often responsible and removal of any single focus without result, great pains must be taken to locate the proper focus" Here, we find a misplaced or aberrant summary, which, if necessary, should have been given at the end of the article. The primary title could then be reduced to a few words To find the "lowest common denominator" is the whole duty of the editor as well as of the indexer and classifier

Having made a plea for the summary, this article can do no less than have one

(1) From those engaged in bibliographic research there is asked patience with the indexer and an understanding of his problems If the material sought is not found under the heading which suggests itself, try other headings. The material is there

(2) To the medical writer there is no better advice than that of Billings "Have something to say, say it and stop" To which he added "Then, give the article a proper title"

Progress of Medicine

For 1926*

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INTRODUCTORY REMARKS

THE year 1926, which found the conquest of the North Pole completed by means of airplane and dirigible, was remarkable for the recording of much new data of great importance obtained in the domains of physics, chemistry, and biology. It will, however, be some years before many of these discoveries are made applicable to medicine, first to the specialist, then to the general practitioner, and finally to the public at large.

The physicist in order to make his investigations comprehensible uses figures of such dimensions that they can hardly be grasped by the mind of man who is now told that there are four dimensions and that both time and space have an ending. Thus we learn from authoritative sources that minute electric currents have been amplified 700 billion times so that we can now hear the impact of a single atom of radium against the walls of its container and that the heart-beats can be duplicated and reduplicated so that they sound like claps of

* The first number above a proper name or disease, and at the end of a paragraph, is the key to the journal named in the list of medical references printed at the close of this article from which the subject-matter, thought, or abstract is taken, the next numbers, separated from the journal number by a (/), refer to the month (Roman numeral), day of the month, and year in which the journal was published, the year of those references published in 1926, the period more especially covered by this article, not being given. *All references, therefore, in which the year is not mentioned, appeared during 1926*. In those instances where apparent omissions of important medical subjects are noted by the reader, it will usually be found that original papers covering such matters have already appeared in the pages of the INTERNATIONAL CLINICS during the past several years or articles are in course of preparation for future publication.

distant thunder! We are further told that the observable sphere of the universe to-day has a radius of 140 million light years, including some 2,000,000 nebulae, and that a new 300-inch lens costing \$14,000,000 is to be built which will increase these observations of space nine fold! Then the beam of light which travels, according to the newest measurements, at the rate of 186,284 miles per second, may be broken up photographically into sections as small as three feet each!

The announcement by Ludwig Haberlandt, of the University of Innsbruck, of the discovery of a "heart hormone," originating in the cardiac muscle itself, which keeps the heart beating, may if confirmed be of the greatest importance from a therapeutic standpoint. Hearts of frogs which had not pulsated for three and one-half days were started off again by this hormone from other hearts just removed from the body. Medicinally, the slaughter houses would make an abundant supply of the hormone easily available.

That he has found an heretofore undescribed organism, as the causative agent of acute rheumatic fever and its associated manifestations, such as chorea and arthritis, is the belief of James C. Small, of the bacteriological laboratory of the Philadelphia General Hospital. This bacterium, named *Streptococcus cardio-arthritis* and obtained from patients with acute rheumatic fever and chronic joint affections, produces characteristic symptoms in rabbits, and the administration of serum from these rabbits and also from immunized horses causes prompt relief of the toxæmia and marked improvement in the symptoms.

Aycock and Kagan, of the Harvard Medical School, believe that they have found a means of artificially immunizing against infantile paralysis, as experimentally their investigations show that one-third of the cases treated with the causative virus in the form of a vaccine weakened by glycerine and carbolic acid were rendered immune. Edward C. Rosenow, of the Mayo Foundation, has evolved a new skin test of susceptibility to infantile paralysis.

The causative agent of diabetes is stated by D. H. Bergey, of the University of Pennsylvania, to be an ultra-microscopic and filterable virus, as he claims to have induced the disease in rabbits within three weeks after the injection of these organisms obtained

from the urine of a diabetic. The virus may be grown anaerobically on serum broth, its virulence being increased thereby.

The Department of Agriculture through the work of B. A. Linden has announced the discovery of a streptococcus producing food poisoning as does the members of the paratyphoid-enteritidis group, now quite thoroughly studied. Several outbreaks of cheese poisoning have been traced to this organism.

Professor Fenyvessy, of Budapest, has used a specially prepared influenza serum in one hundred patients, and claims complete recovery in every instance.

Numerous announcements about vitamins have appeared, such as those by S. I. Bechtel, of the agricultural experimental station at Pennsylvania State College, that cows manufacture their own vitamin B, and of the U. S. Department of Agriculture that beef enhances to a remarkable degree the nutritive value of protein in wheat, cornmeal, oatmeal, and rice.

Reports upon narcosan, the original promulgation of which attracted such wide publicity in the newspapers during 1926, are so varied that the use of this drug in the treatment of drug affections should be suspended by the general practitioner until further hospital experiments, now being carried on by competent observers, are reported upon.

Gabriel Bertrand, of the Pasteur Institute, finds the hypoglycæmic power of insulin to be markedly increased by the addition of nickel and cobalt, and advises the use of these agents in conjunction with insulin in the treatment of diabetes. From analysis he has found that various samples of insulin vary much as to their contents of nickel and cobalt, some preparations having several hundred times more of these elements than other parts of the body. Bertrand advances the theory that these agents may act as a coferment as manganese does in the case of lactose, and names these particles "*infiniments petits chimiques*."

The discovery that canine distemper (which is thought to be closely allied to human influenza) is due to an ultra-microscopic virus is announced by the British Medical Research Council. The investigators include Dr. William E. Gye and J. E. Barnard, who are studying this problem as well as cancer. The Council has also ex-

pressed gratitude to the American Distemper Council for its aid, and announces the expectation of evolving a method of immunization

Ludwig Hektoen, of Chicago, states that there has been developed a new cutaneous test applicable to tuberculosis which is similar to the Schick test for diphtheria and the Dick test for scarlatina

During the past year there appears to be little doubt but that the treatment of tuberculosis by gold and of cancer by lead have gained in favor among those capable and willing to weigh the evidence of the various recent reports that have appeared from many widely-scattered sources. The value of the Spahlinger treatment of tuberculosis has been discussed several times recently in the English Parliament, and just before the close of the year the Parliamentary Secretary to the Ministry of Health announced that materials necessary for a scientific investigation of the treatment in Great Britain had not yet been forthcoming

For some time Henderson, Haggard, and their numerous co-workers have advocated that de-etherization with carbon dioxide is a simple, effective method of restoring the anæsthetized patient to normalcy, and in the prevention of post-operative pneumonia. An emergency tank of CO₂ in the operating room is considered by Ethel Righetti, of San Francisco, as even of more importance than one of oxygen

According to *Science* (Supplement) of December 24, 1926, Abel has put the valuable properties of insulin into crystalline form, the enzyme urease has been crystallized, helium changes nitrogen to fluorine, and then to hydrogen and oxygen (Harkness, of the University of Chicago), the germ of Peruvia or oroya fever has been isolated by Noguchi, the spleen is an important source of the antibodies of the blood, F d'Herelle believes the bacteriophage to be a living parasite, and not a chemical factor in destroying germs, wood has been converted into sugar, the secretion of the adrenal glands regulates body-heat, eyes of the chicken embryo grow *in vitro*, a 11-day-old embryo has been studied, there are toxamins opposing vitamins, polonium is of use in treating syphilis, minute bacteria have been coated with gold to make them visible by artificial means (Bechold), a definite chemical compound causes the skin reaction in tuberculosis, trachoma is a diet deficiency disease, and several new synthetic quinine preparations have been discovered

But announcements such as these and many others that might be mentioned of the year 1926 must be confirmed by others before being accepted or they may meet the criticism of a D T MacDougal, of the Carnegie Institute of Washington, who characterized Sir Jagadis Chunder Bose's claims to there being heart-beats in plants as "mere figments of a romantic Oriental imagination, unsupported by any genuine scientific fact," or that of a Simon Flexner, of the Rockefeller Institute, who states that investigations there prove the virus which causes lethargic encephalitis has not yet been isolated and that it is not identical with that of the virus of herpes

During the past several years the physician has undoubtedly lost ground in moulding public opinion and has perchance had to give up a part or entirely lost many of his so-called prerogatives which he considered to be his by right of eminent domain Thus Professor Newfield, Director of the Robert Koch Institute for Infectious Diseases at Berlin, in the Curtis Lecture on Preventive Medicine delivered at the Harvard Medical School, ended his lecture by stating that the prevention of disease was now only in small part a medical problem, the sociologist and the educator playing as important a part as the physician in the prevention of the means of direct infection, and of the existing predisposing conditions

So enthusiastic is J Bell Ferguson, health officer of the County Borough of Smethwick, England, of the great therapeutic value of the quartz-mercury-vapor lamp that he believes "ultra-violet radiation should be available in every infant welfare scheme in every town Prophylactic use of ultra-violet radiation in the first year of life would banish rickets, tetany, and spasmophilia from our infant population."

More and more attention is being paid to the disease of pre-historic man of the paleolithic or stone age, which according to Roy L Modie is not certainly represented in the Western Hemisphere although discoveries recently made would seem to show an association of early man with certain of the extinct mammals There is now a tendency of the best-informed scientists, just as anti-evolution laws are being passed by the various states, to throw doubt upon the darwinian theory, and to advocate that the higher apes have degenerated from man, and revolting, but perhaps revolutionary, experi-

ments are now being carried on to see if impregnation of these animals cannot be accomplished by the *in-vitro* introduction of the semen of the Genus *Homo sapiens*

The Sheppard-Towner maternity law has been extended until June 30, 1929, when it becomes automatically repealed. This act, prohibition, and the regulations of the narcotic laws appear to be the chief national legislation in which the physician has interested himself during the past year.

Insufficiency of the thyroid gland is believed by Francis A. E. Crew, of the University of Edinburgh, to be the cause of senile baldness. This has nothing to do with the loss of hair of those around thirty, a condition so often attributed to heredity.

As we go to press influenza is raging in Europe, and isolated deaths from this affection are being reported from various places in America and Canada. The severest epidemics of small-pox that England has had for half a century are now going on there.

A judge has recently handed down a decision, in Belfast, Ireland, that a doctor is not entitled to grade his charges according to his patients' means. "Capacity to pay," says a recent editorial in the *Lancet*, "it seems on this judgment, must not be taken into account, the doctor must place rich and poor upon an absolute equality when he makes out his charges. Is this the idiosyncrasy of an individual judge, or do the law courts begin to perceive a change in public opinion which future decisions must reflect?"

The panel system is gradually accustoming a large proportion of the medical profession to the rigid tariff of scheduled charges. If and when the whole of our population is treated by a state medical service—which some expect and of these some hope—fees will be either standardized or entirely abolished. Meanwhile, in grading his fees according to the capacity to pay, the medical practitioner does but pass on to his patients the system applied to himself as a payer of rates and taxes."

The various experiments now being carried on in regard to the methods of conducting governmental affairs, as in Russia, Italy, China, and many other places throughout the world, are having, and will continue to have, far-reaching results upon our present-day civilization and, of course, upon the practice of medicine itself. Who can foretell what the harvest will be of the seeds which germinated during 1926?

ALBUMINURIA

Carrying the references back to Bright, in 1827, Joseph K. Calvin, Bertha L Isaacs and Jacob Meyer ^{19/vi-12} have made a careful digest of the frequency of albuminuria in children and have classified it according to its clinical significance. One group of 189 children not reporting sick, though being taken from poor surroundings, when contrasted with another group of 331 children in an orphans' home under careful medical supervision, showed four times the percentage of albumin with a correspondingly high percentage of focal infections.

ALIMENTARY TRACT

Intestinal Fermentation.—In a logical consideration of the intestinal upsets of middle life, usually depending on an intolerance for carbohydrates, A. I. Kendall, ^{19/iii-13} of St. Louis, stresses the quantitative rather than the qualitative character of the symptoms of constipation, meteorism, precordial or hypochondrial pain, hypotension, special food intolerance, and a physical fatigue without a correspondingly low mental lassitude. This condition is commonly confused with neuroses, especially in women, ulcers of the digestive tube, pathological gall-bladders, intestinal cancer, mucous colitis, and Herter's "saccharobutyric putrefaction." This latter condition is described by Herter as "a form of intestinal derangement characterized by a chronic putrefactive process having its seat in the large intestine and lower ileum, and due to the action of very large numbers of strictly anaerobic, butyric-acid-producing bacteria capable of multiplying by means of spore formation." These two conditions, though they produce similar symptoms in like individuals, and otherwise resemble each other clinically, differ in that the putrefactive process is accompanied by diarrhoea, while the fermentative one is attended by constipation, and those symptoms which are mechanically produced by formation of large quantities of gases. This author finds the *Gas bacillus* and more rarely the *Mucosus capsulatus* replacing the normal flora of the intestine, though does not claim that these are the definite etiological causes of this condition, and yet is convinced that those dietary precautions which are unfavorable to their growth, are the best therapeutic measure against it. These dietary measures are a strict avoidance of carbo-

hydrates, a slight increase in proteins, and the generous ingestion of well soured milk, up to one and one-half quarts daily. It is notable that he does not enter into the usual tedious argument as to the relative value of the various methods of producing these soured milks.

In all probability these are the two conditions which make man pay for the indiscretions of diet, and which led the ancients, and the mediæval ecclesiastics to their codes of fasting and moderation in diet. Since all individuals who overeat do not have to pay through discomfort for this indulgence, since the thin cadaverous human can often commit those sins of the palate, which others must expiate in ill health, it can reasonably be presumed that those mechanical and chemical conditions of the intestinal tract, produced by excess action of those allies of digestion, fermentation and putrefaction, are the underlying factors which break down our public men in the heyday of their community usefulness. Many of our soundest clinicians still adhere to the principles of these theories set forth by Metchnikoff, and blame these perverted alchemies of the large bowel for rheumatism, renal and cardiac lesions, hypertension, neuritis and nervous breakdowns, and those kindred ailments which cut down our most valuable public men at that time in their careers when they are repaying the community for the share it had in their success, with the ripest and most useful of their public service. Arbuthnot Lane, of England, and J. W. Draper, of New York, are two of the leading exponents of this theory, and the large group of clinicians who are behind the present-day lactic acid and bacillus acidophilus method of therapeutics, appreciate fully these angles of the pathology of the human intestinal tract. This group of medical minds will be the ones to save us from that wave of hyperenthusiasm which always follows any new theory, and is at present so strong for the entity known as focal infection.

ALKALOSIS

Alkalosis in Surgical Conditions—Frederick A. Bothe^{5/x} says it is necessary to make a study of the blood-chemistry in cases of persistent vomiting. In pre-operative alkalosis the lesion producing the intestinal stasis is more important than the alkalosis. Repeated gastric lavage relieves the stasis, and normal pH and 10 percent.

glucose help to combat depletion of chlorides and renal insufficiency, saline and glucose may be given intravenously. As a post-operative complication, alkalosis is more serious. Repeated lavage and the above-named drugs, used other than intravenously, relieve a number of cases, but in severe cases 500 c c of normal saline and 500 c c of 10 per cent glucose intravenously, two or three times a day, may be necessary. The glucose helps spare the protein and promotes diuresis. During treatment the blood-chemistry should control the therapeutic procedure. Jejunostomy may be indicated where the drugs fail. After that gastric lavage may be added to the intravenous therapy and the patient fed through the jejunostomy tube. Alkalies are contra-indicated. It is not possible to estimate in how far alkalosis is a factor in post-operative complications in other conditions of the abdomen which are associated with persistent vomiting.

ALLERGY

The Use of Non-specific Foreign Protein in the Treatment of Inflammatory Lesions in the Female Pelvic Organs—Though the treatment used by A. D. Campbell^{18/19} is not entirely new, as he states, his results are so good that they should be reported. Blood, milk, turpentine instillation into the fallopian tubes and actual cautery of the cervix were used by Campbell in 300 cases of pelvic inflammatory disease, where the pelvic viscera formed a painful mass. The injections were made into the genital region a hand's breadth below the iliac crest in the mid-axillary line. The initial dose was 4 c c, the subsequent 6 to 10 c c., every five days. Local treatment of instillation of argyrol, 20 per cent, picric acid, 3 per cent, to the cervix, and daily douches, were used simultaneously. The acute cases showed 55 per cent. of cures with nine weeks of treatment, chronic 18 per cent, with twelve weeks. Forty-four per cent of the infections of the higher portions, so-called peritonitis, salpingitis, or tubo-ovarian infection, were cured, 40 per cent improved and 16 per cent. uninfluenced. The results of treatment of chronic types, gonorrhœal or otherwise, with acute or early infections, was disappointing, with 20 per cent. cures in three to four months. The results in post-partum pelvic lesions, lacerations of the cervix and infiltration were gratifying.

Campbell, also, reports on 77 children, who presented pro-

tein sensitization, of which number 57 were correctly diagnosed. Multiple sensitization is the rule. The test proteins must be kept moist for at least thirty minutes, cereals, fruits, vegetables, meats, fowls, fish, milk, egg, nuts, furs, bacterial proteins, epidermals and pollens were used. Often a history of excessive perspiration is obtained in the patients, and children often will absolutely refuse food to which they are sensitive. Group sensitization is seen, the individual picking out all the fruits or vegetables or meats. Eczema in breast-fed infants responded to removal of offending protein better than any other group. Eczema due to foodstuffs has a tendency to disappear spontaneously at the age of two. Asthma is a frequent sequel, and asthma and eczema often co-exist. The earliest manifestations may be persistent head colds, croup, recurrent bronchitis and the first attacks often closely simulate bronchopneumonia, though fever is generally absent. Asthma due to foodstuffs is relieved by vomiting. If the offending protein cannot be removed for some reason, sensitization must be carried out. Hay fever in children responds well to sensitization if all pollens are used. Urticaria did not respond as well, because, as J. F. Burgess points out, it is an essentially vascular disturbance.

ANÆMIA

Addisonian Anæmia—In a rather complete consideration of the cause and effect mechanics of this condition A. T. Todd^{10/vii-20} indicates the growing tendency in the belief that this condition is an ebb and flow exhaustion toxæmia of the blood-forming organs, over a considerable period of time, which finally reaches a stage so low as to be irrecoverable. His enumeration of the prodromal signs, which he claims exist often for years, and which show this rise and fall, as the tide of resistance of the blood-forming organs masters or is overcome by the intensity of these toxæmias, is most helpful in the early diagnosis of this disease. These waves of intensity usually attain three or more high peaks before the diagnosis is made. The early signs of the true onset are tiredness and weakness, and the other symptoms of anæmia, while dyspepsia, alternating diarrhoea and constipation, which occurs in 50 per cent of cases, premature grayness, and a glossitis of the type that is often the sequel of dental supuration are the prodromal signs. The disease consists of gradually

increasing periods of anæmia, separated by gradually decreasing ones of normality, save for the diarrhœas and the glossitis. The disease is amenable to that treatment which clears up the toxic or septic conditions that are responsible for the hemolysis, if instituted in those earlier periods that are followed by the unaided remissions, and the paper affords a critical résumé of the earliest symptoms with this object in view. It is known that 4 per cent of normal individuals congenitally show a complete absence of hydrochloric acid, but since the incidence of this disease is far below this, and since achlorhydria is said to be also subsequent to sepsis, the relation of this defect to anæmia is not definite. Intestinal stasis, and the lack of normal antiseptics in the upper portions of this organ, due to lack of hydrochloric acid, with the resulting fermentation and putrefaction with their usual alterations of the flora, especially the increase of *Streptococci*, *B. coli*, and *B. welchii*, are thought to be the real causes behind this disease. Though the colon bacillus is not usually thought of as producing hemolysins, it elaborates these substances from the amino-acids found in the upper intestinal tract, and this author isolated hemolytic strains, from four out of five of these patients. He believes that there is a factor of heredity in this condition, but that it functions chiefly in the production of a soil favorable to those septic conditions that elaborate substances toxic for red cells and the blood-forming organs, and that the achlorhydria aids the process by allowing a marked decrease in the normal antiseptics of the upper intestinal tract. Several theories are advanced as to the mechanics of the process, that the toxæmia below the threshold of disease production exerts a stimulating influence on the blood-forming organs with excessive blood formation, that this hasty formation of red cells results in defectives which are filtered out by the reticulo-endothelial system, which by the increase of the function necessary to absorb them causes it to produce an excess of hemolysins, and that the toxic substances depress the inhibition of the adrenal gland upon the reticulo-endothelial system. The usual clinical signs are cited, the high color index, polychromia, and nucleated reds, especially the presence of megaloblasts, being the cardinal ones. The increased size of the red cells is stressed as an important finding, and this is given as the cause of the high index, which returns to normal in the remissions. To support a

diagnosis of this condition the author claims that anæmia, leukopenia, absence of 'wasting, increase of the size of reds, glossitis or its sequelæ, achlorhydria, and excessive urobilinuria and direct bilirubin in the blood are usually necessary, though there are exceptions to almost all of these findings. This writer believes that subacute combined degeneration due to anæmia is confined to the addisonian type, and points out that the excessive hemolysis, and its signs of urobilinuria and direct bilirubin in the blood are absent when the cases become aplastic. This type of anæmia is thought to be simply a terminal stage of the addisonian form. The thyroid and adrenal glands are mentioned as possible causes, and deficiency of the external secretion of the pancreas, because of the atrophy of the duodenal mucosa, is considered.

The treatment consists of stimulation of the blood-forming organs, and arsenic is the most important drug for this purpose, and the method of administering it does not seem to have any particular influence. Removal of the spleen, except where there is an excessive enlargement, is advised against. The removal of the marrow of the long bones, with the hope of a replacement with a healthier marrow, is mentioned. Iron is not considered of any value, though the hope is held out that it may block the endothelial system, when given intravenously, and function like a splenectomy. Improvement of digestion by correction of the achlorhydria, and more important, the furthering of the antiseptics of the upper intestine, already aided by the artificial replacement of the hydrochloric acid of the stomach, by an increase of the intestinal acidity with a lacto-vegetarian diet and the lactic acid-forming bacteria are considered most important. Kaolin, because of its absorption of toxins and precipitation of bacteria, is valuable, and colonic lavage when the indican still remains high even to the extent of an artificial anus is advised.

ANÆSTHESIA

At a discussion before the section on anæsthetics of the British Medical Society, F. H. McMechan,^{10/xii-26} Editor of *Current Researches in Anesthesia and Analgesia*, points to the failure of the newer gas anæsthetics other than nitrous oxide to stand the test of time along with ether and chloroform, and for those who have the necessary knowledge of physics and physiology for its proper administration in

combination with oxygen it has served as the ideal method for normal and bad-risk patients. Its narrow margin of anaesthesia requires a greater knowledge of anaesthetics than the administration of ethylene, acetylene, or propylene, yet the majority of the experts only have recourse to these gases as synergists for the nitrous oxide-oxygen method. Those who have not made an exact specialty of this method have found that the newer gases have a broader margin of anaesthesia, a simpler technic, and no appreciably greater danger to the patients. Treating of the theory of these substances, he shows how the value of an anaesthetic depends on its power to replace the oxygen in its combination with the blood, but in a manner loose enough to be rapidly thrown off. Ether and chloroform, because of their high boiling-points, remain in the tissues long enough to exert their lipoid solvent action on the organs which contain this substance in any quantity, like the kidneys, the liver, and other highly specialized structures.

The newer gases have lower boiling-points, and the consequent increase in the rapidity of their elimination negates their liposolvent qualities. In a consideration of the value of these new gases from the standpoint of their anaesthetic coefficient, which includes toxicity and potency, as compared with the margin of anaesthesia, and lethal dose this writer grades them in the following way: Nitrous oxide, 0.85; ethylene, 1; acetylene, 1.5; propylene, 2.25; butylene, 4.5; and amylene, 15. Ethylene admits of a higher percentage of oxygen for induction, a still higher one for maintenance, which is constantly being raised because of its slightly cumulative effect, and has a wider margin and a deeper analgesic effect. Acetylene has the same qualities as ethylene, and to a greater degree, allowing one-fourth to one-half more oxygen under its induction, and a greater difference as the anaesthetic is carried on requiring a 5 per cent. decrease and a similar increase of oxygen for each five minutes of its employment, and upon this fact its cumulative effect is largely dependent. Propylene carries these same qualities, but to an added degree, but as it shows a high rate of circulatory collapse, it is not considered a safe anaesthetic by McMechan. These higher percentages of oxygen, for induction and maintenance, allow of a better preservation of the alkaline reserve, a smaller chance of anoxaemia, and a bet-

ter knowledge of their physiology and physics with the possibility of numerous combinations point to great possibilities. The gas anesthetics have a shorter duration, surgical relaxation can be more quickly obtained and as rapidly dissipated, recovery is almost immediate, pathological alterations of tissue are greatly minimized, the anesthesia may be repeated at will, and the danger signs are as plain as with ether, while the heart and respiration are more elastic in their reaction from the deeper stages of unconsciousness. If these gases could be given in a pressure chamber, where one-sixth of an atmosphere of oxygen could be maintained, they would be surgically ideal, as well as being made absolutely safe. Spectroscopic examination of the blood after these gases fails to reveal any combination with the hemoglobin, and in spite of the changes of the color of the skin, they are only in physical solution in the blood and only remain fleetingly soluble in the lipoids.

ANTIGENS

A New Antigen for Therapeutic Immunization.—Thomas Horder and N S Ferry^{10/vii-31} have found that the clear fluid after bacteria are washed and centrifugated is highly antigenic, while the bacilli themselves were very low in antigenic content, but did contain the protein toxic products. The name ecto-antigen is suggested for such a product, and for products made in such a manner as to contain only this ecto-antigen the term "immunogens" is proposed for such an aqueous solution which is low in protein content, high in antigenic properties, and practically non-toxic. Reports of the past year in the treatment of streptococcal, pneumococcal and gonococcal infections have been good.

APPENDICITIS

Dr A. B. Gouley showed before the Philadelphia Pathological Society on January 13, 1927, a specimen of amebic appendicitis with perforation. We would again call the attention of the readers of the INTERNATIONAL CLINICS to the relative frequency with which amebiasis will be found in the United States if carefully searched for.

ASTHMA

Method of Treating Asthma by Radiation.—In his preliminary note on treatment of asthma by radiation S Gilbert Scott^{10/vi-5} warns that careful attention must be given to details of the technic,

the failure to do so has led to numerous discouraging results. The dose, as first employed, was the cancer dose of maximum tolerance—20 X through 4 mm. of aluminum, measured on the skin with 25 mm spark-gap. Nausea and sickness usually followed. Now Scott employs 10 X through 3 mm. aluminum. A large radiation area is necessary. High voltage was undesirable because of the general upset and risk of damage to deep structures. The whole trunk should be included in the field, as radiation of the thorax alone does not yield the same results. The average case requires but one treatment a week, the severer ones, two. After the fourth dose, an interval of two weeks is allowed, the doses are given once a month for four months and patients instructed to come back as soon as wheezing occurs. The method was accidentally discovered when treating cancer of the breast and the author states that the procedure is based on no theory.

BLOOD

The Clinical Significance of the Reticulated Red Cells—Reticulation and stippling in cells have been looked upon by most observers as evidence of regeneration. Dameshek^{9/17-29} finds that the reticulated count is the best index to bone-marrow activity and better than nucleation of the red cells, polychromatophilia and stippling and that there is no better index to prognosis in pernicious anæmia than the count of the reticulated cells. In 50 cases of pernicious anæmia, reported by William Dameshek, of the Blood Laboratory, Boston City Hospital, with about one hundred remissions and relapses, this particular cell rose, in 80 per cent. of the cases, to a significant figure (at least 5 or 6 per cent.) before remission, and, in 90 per cent., fell or remained at a low figure during a relapse. In pernicious anæmia the reticulated count is apt to be higher and more subject to variations than in normal blood. Counts up to 5 per cent. should not be considered indicative of an impending remission. Blood transfusions were futile in the face of continued very low reticulated counts. In the primary anæmia of pregnancy there is a high color index and this count usually behaves as in pernicious anæmia. "The reticulate count of the red cells is a true index of the amount of bone-marrow activity."

Blood-groups—Charles A. Doan^{10/v-22} points out the fact that

there are more than four different human blood-groups. In a very carefully worked out paper, he shows evidence that there is an incompatibility between plasma and white cells, which is shown to be a very important factor for safety in the giving of transfusions, especially in those cases where the patient is *in extremis*. It is clearly demonstrated that there is, in certain blood-plasmas, a decided toxic or disintegrating substance for leukocytes, which decreases their motility, and eventually destroys them. All white cells show this effect, though to different degrees, and the initial change resembles a dehydration of the cytoplasm, with shrinking, vacuole formation, and the other signs of death and dissolution.

The *in vitro* tests, of the speed of this action on the white cells, show a 20 per cent decrease in one hour, 50 per cent in three hours, and 80 per cent. in twenty-four hours. These tests were made with carefully controlled checks, after the phenomenon was satisfactorily observed clinically. This lysis of the white cells is most important in the transfusions done, where there is a septic element, as when this occurs there is a rapid total decrease of the defensive leukocytes, whose increase is a vital factor to recovery. There is an incompatibility between white cells and plasma, which, though not as common as that between it and the red cells, is just as serious. A classification of this incompatibility is difficult, as there are twenty-seven different combinations possible, many of which occur not infrequently. Approximately 40 per cent of the forty individuals studied were universal donors, which this investigator calls group A. Five per cent. have cells which are susceptible to practically all plasmas, and are called group Z. The remaining 55 per cent show nine different combinations, which have not as yet been thrown into groups. The writer feels this white cell incompatibility is of sufficient importance to necessitate that bloods be matched for the detection of this quality in all transfusions where the recipient is in a weakened condition.

Practical Points in Blood Grouping and the Selection of Donors for Blood Transfusion—R. B. Lloyd ^{10/x} believes there is sufficient evidence that more than four blood-groups exist, and that there are certain abnormal types as yet not clearly defined. He also feels that there is an evidence of an unusually high isoagglutinin reaction—

in certain of the universal donors. For this reason he believes that the ordinary classification of blood donors and recipients should always be checked in addition by use of matching tests. This checking should consist of the usual matching of one serum against the cells of the other. Where there is no time to perform this test the writer advises the use of a universal donor who has been used before without any bad results. In blood transfusions in the tropics, in addition to syphilis, the danger of communicating malaria, kala-azar, and filaria must be considered. He concludes that blood-groups are determined by the mendelian law of heredity, and that if both parents are group two, their children will be either group two or four, so that the blood of either parent cannot be transfused into the untyped offspring, which might be a group four †. The author also advises that homologous skin grafts should not be attempted unless the two individuals are of the same blood-group.

Quantitative Determination of Sugar in the Blood—For the determination quantitatively of the sugar in the blood, the Bang micro-method is recommended by S. Marino, of the Royal Medical Clinic at Rome. Instead of taking a given weight of blood, 0.1 c.c. of blood is used, which is withdrawn from the patient by means of a 1/1000 pipette. For carrying out the method the following procedure is used.

(1) A de-albuminizing solution of 1.5 grams uranium acetate is dissolved in 150 to 200 c.c. water, to which are added 650 c.c. of a saturated solution of potassium chloride, with 0.75 c.c. hydrochloric acid (25 per cent strength), bringing the whole up to 1000 c.c. by the addition of water.

(2) An alkaline solution of 75 gr. potassium carbonate and 20 gr. Rochelle salt in 1000 c.c. of water.

(3) Copper iodide solution, made with 50 c.c. of potassium iodide N/10 and 1.25 gr. copper sulphite diluted to 500 c.c.

(4) A 5 per cent solution of potassium iodide.

(5) A starch solution. 1 gr. in 100 saturated solution of potassium chloride.

(6) A sodium hyposulphite solution N/100.

(7) A sulphuric acid solution (20 per cent. by volume).

† Ottenberg, *Journal of Immunology*, 1921, 6, 363.

One-tenth c c. of blood is taken by means of a pipette and is dropped into a test-tube containing 6.5 c c of the de-albuminizing solution. The pipette is washed with distilled water, and the mixture is allowed to stand for at least two hours, and possibly three or four hours. It is then centrifuged and the supernatant liquid, down to the coagulum which adheres to the bottom of the test-tube, is decanted off into a beaker of about 100-c c capacity. Six and five-tenths c c. of de-albuminizing solution are then added to the precipitate, and again carefully mixed, after about thirty minutes it is centrifuged until a clear liquid is obtained, which is added to the liquid already decanted. To this decanted liquid are now added 2 c c of the alkaline solution and 2 c c of iodide of copper solution, then this is brought to the boiling-point by means of steam jets brought to the bottom of the beaker by means of a tube ending in a bulb provided with small perforations. The boiling must never be violent, and should last exactly four minutes, after which time 2 c c of the 20 per cent sulphuric acid are added, then it is re-boiled in the same container and the part of the tube which was submerged in the liquid is washed with water. This is allowed to stand for five or more minutes, after which about 25 c c of water are added. If the liquid remains hot it is cooled with running water, and then 5 c c of solution of iodide are added, next two drops of the starch solution, and the iodine set free is titrated until decolorization by means of the hyposulphite solution.

At the same time a control is made, carried on without any blood, by using all the solutions with the identical procedure to that of the liquid under examination. For the titration of the control, if the solutions have been properly prepared, and the reagents are free from reducing substances, 2 c c (more exactly 1.93 to 1.97 c c) of solution of thiosulphite of sodium N/100 are needed for this purpose.

The final calculation is made as follows. There is subtracted from the final figure cubic contents of thiosulphite used for the measurement of the liquid under examination, the difference divided by 0.28, indicated in grams the amount of glucose contained in 1000 c c of blood, considering that the 0.28 c c of thiosulphite corresponds to 0.1 milligram of glucose. If, for example, for the control there are employed 1.95 c c of the thiosulphite solution and for the liquid

under examination 1.53 c.c., we have as a final result 1.95 - 1.53 equals 0.42 0.28 equals gr 1.50 per 1000 c.c. of glucose

Quantitative Determination of Free and Combined Fats in Blood—Ten cubic centimetres of defibrinated blood in 96 per cent. alcohol are heated at a temperature of 37° C for twelve hours. The extraction is made in a Kumagawa-Suto apparatus with boiled absolute alcohol for eight hours, and finally extracted in chloroform. Evaporate the alcoholic extract in a hot-water bath at reduced pressure, until dry, maintaining a temperature of from 40° C to 45° C in so doing. To the residuum of the alcoholic extract is added the chloroform extract and this is carefully evaporated until dry. The residue is taken up with chloroform, and is then divided into three parts, of which one serves for the determination of the lipoid-phosphorus, according to the method of Neumann, being precipitated in the form of phosphomolybdate of ammonia. The final determination is arrived at volumetrically by means of a decinormal solution of hydrochloric acid, dissolving the precipitate in sodium hydrate titrated at 0.1 N. The second part is used for the determination of cholesterol, free and combined, by means of the digitonin (method of Windrus). The third part is used for the determination of fatty acids, both free and combined as phosphates. In order to determine these substances, the chloroform residue is dissolved in 50 c.c. of pure acetone, to which is added 1 c.c. of alcoholic solution saturated with magnesium chlorate. This is allowed to stand for twelve hours. In this way a precipitate is obtained which corresponds to the phosphides, the acetone which floats on top contains the crude fatty acids, the acetone is dried off and these two parts are subjected to saponification according to the usual methods now in vogue, the molecular weight of the fatty acids being placed at 280. This method is especially recommended by S. Marino, of the Royal Medical Clinic at Rome.

CALCIUM

Calcium as a Food and the Relation of Its Assimilation to Ultra-violet Radiations—H. Steenbock,^{25/v} of University of Wisconsin, College of Agriculture, states that it is known that calcium cannot be assimilated from the food under certain circumstances, and even portions which have already been assimilated and built into body tissue cannot be retained in the absence of ultra-violet rays. Calcium

provides rigidity of bone, functions in connection with irritability of muscle and nerve and evidence is accumulating that it may play a part in the permeability of cellular membranes Steenbock showed that exposure to ultra-violet rays resulted in activation of the anti-rachitic vitamin or vitamin D, which may be present in an activated or an inactivated form It is potent in the stimulation of growth Any fresh plant or animal oil or fat, it was found, could be made active as anti-rachitic, some as active as cod-liver oil Steenbock believes that the latter derives its activity from the ultra-violet rays which penetrate water Rats receiving olive oil which had not been irradiated had a bone ash of 48.9 per cent., while those receiving irradiated olive oil exposed for thirty minutes to the Alpine sun lamp, had 56.5 per cent Mineral oil cannot take up this activity Rats irradiated before being fed cereals were much improved, rachitic bones being completely healed Hay cured in the dark was inactive, such cured in sunlight was active Sunlight was found less efficient than the quartz-mercury vapor lamp

Practically any naturally occurring food or feed can have anti-rachitic properties bestowed upon it by ultra-violet radiation, as lipoidal unsaponifiable compounds are widely distributed in nature There are the compounds containing ability to become anti-rachitically activated Sugars, glycerides, water, salts, gelatine, alcohol, ether and petroleum cannot be activated The anti-rachitic properties of milk of an animal exposed to ultra-violet rays were seen in a goat exposed to a quartz-mercury vapor light Leg weakness in poultry was shown to be rachitic by the effect produced by cod-liver oil exposed to ultra-violet rays It was furthermore found that decrease in egg production during the winter is due to deficient illumination Irradiation of cod-liver oil, in the author's experiments, proved that little was to be gained by it Deranged calcium metabolism is benefited by direct ultra-violet irradiation The molecular changes produced by it are permanent and a synthesis of new compounds.

CANCER

This subject is now at the peak of its interest to the lay public, as well as the medical scientific world This interest, which amounts to an alarm, makes the public press seize and exploit every medical

article which even remotely suggests the discovery of anything new or additional in the knowledge of cancer, and has its reason in the enormous increase that is appearing in the official death-rates from this scourge. These increases are approximately the same, wherever there is maintained the proper registration of mortality statistics, and it is hoped that in the near future these registration areas will take in all the states of the Union, and the various statisticians analysing these reports agree that this increase amounts to from 40 to 50 per cent in the last twenty-five years. Along with the improvement in the statistics, which has better enabled us to evaluate the extent of cancer, there has been also an enormous improvement in the accuracy of diagnosis of it, which, many investigators claim, accounts for the bulk of this increase. These advances in the knowledge of cancer, and the new methods of treatment, which have been developed against it, have stimulated a high interest on the part of the public, who have joined with the medical fraternity in an organized war on this enemy of mankind. The increase of the accuracy of mortality statistics of all countries in the last ten years has enabled investigators to more intelligently apply the increase of cancer to the census reports, and F. L. Hoffman,³⁴ in a statement made before the Belgian Congress on Cancer in 1923, claims that this scourge is maintaining a steady increase of 2 per cent a year, in spite of the immense public movement against it, the improved methods for earlier diagnosis, and the remarkable advances which have been made in its treatment.

This increase is confined to the civilized areas of the earth, and while the death-rate amongst the uncivilized races still remains stationary at 10 per 100,000, in the former it has risen from 61 in 1898 to 97 per 100,000 in 1921. It is also significant that sarcoma in the uncivilized makes up about 50 per cent of the malignant death-rate, while it is only 4 per cent of the total in the civilized races. These figures indicate the reason for this alarm, for the numerous international cancer conferences held in 1926, and for the concerted public action that is springing up in the waging of a campaign against cancer.

Analysing the death-rates from cancer in the ten original registration areas of the United States, J. W. Schereschewsky³² shows

that the increase in this selected population of twenty millions amounted to 46 per cent in the recent twenty-one-year period studied, and divides his figures so as to show the distribution of this condition in the different tissues and organs of the body, with a view to an evaluation of the measures which are being used against this scourge. He claims that only 10 per cent of this increase is a false one, due to better diagnosis, and that the remaining 36 per cent is an actual one and represents the enormity of this menace. He also shows that the increase is maintained high for cancer of accessible sites, against which the improved surgical and irradiation methods of treatment have their greatest chances of cure. Investigators of this subject differ greatly in their estimates of the increase of cancer, though those authorities who collect their data from the mortality statistics agree fairly closely, all maintaining that the actual increase is somewhere between 30 and 50 per cent in the last twenty-five years.

On the other hand, those authors who take their figures from autopsy and clinical reports disagree with the former, place the percentage of increase much lower, and claim that over half of it as shown by the mortality from cancer is due to an improvement in diagnosis, and greater skill in the reporting of deaths. Of the latter, those drawing their inferences from autopsy reports show rates of increase much lower than those who use clinical material for their data, averaging to show increases one-half as great, and many investigators in this group claim that there is no actual increase in this condition. It is obvious that mortality rates and autopsy records fail to show those cancers which are cured, and clinical authorities agree that actually proved cures now amount to from 20 to 50 per cent.

The Lake Mohonk Conference of the American Society for Cancer Control—The symposium on cancer control which was held at Lake Mohonk during September, 1926, under the auspices of the American Society for Cancer Control, had a clarifying influence on the hysterical trend of thought in this subject that resulted from the large number of extravagant theories that were founded on the startling type of research appearing in the literature of the previous year. The gist of this beneficial influence is contained in the third resolution adopted at this conference, which is as follows:

RESOLVED, that the following statement of facts and opinions be adopted: Although the present state of knowledge of cancer is not sufficient to permit of

the formulation of such procedures for the suppression of this malady as have been successfully employed for the control of infectious diseases, there is enough well-established fact and sound working opinion concerning the prevention, diagnosis and treatment of cancer to save many lives, if this information is carried properly into effect.

1 The causation of cancer is not completely understood, but it may be accepted that for all practical purposes cancer is not to be looked upon as contagious or infectious.

2 Cancer itself is not hereditary, although a certain predisposition or susceptibility to cancer is apparently transmissible through inheritance. This does not signify that, because one's parent or parents or other members of the family have suffered from cancer, cancer will necessarily appear in another person of the same or succeeding generation.

3 The control of cancer, so far as this subject can be understood at the present time, depends upon the employment of measures of personal hygiene and certain preventive and curative measures, the success of which depends upon the intelligent coöperation of the patient and physician.

4 Persons who have cancer must apply to competent physicians at a sufficiently early stage in the disease, in order to have a fair chance of cure. This applies to all forms of cancer. In some forms early treatment affords the only possibility of cure.

5 Cancer in some parts of the body can be discovered in a very early stage, and if these cases are treated properly the prospect for a permanent cure is good.

6 The cure of cancer depends upon discovering the growth before it has done irreparable injury to a vital part of the body and before it has spread to other parts. Therefore, efforts should be made to improve the methods of diagnosis in these various locations and the treatment of the cancers so discovered.

7 The public must be taught the earliest danger signals of cancer which can be recognized by persons without a special knowledge of the subject, and induced to seek competent medical attention when any of these indications are believed to be present.

8 Practitioners of medicine must keep abreast of the latest advances in the knowledge of cancer in order to diagnose as many as possible of the cases of cancer which come to them.

9 Surgeons and radiologists must make constant progress in the refined methods of technic which are necessary for the diagnosis and proper treatment not only of the ordinary cases but of the more obscure and difficult ones.

10 There is much that medical men can do in the prevention of cancer, in the detection of early cases, in the referring of patients to institutions and physicians who can make the proper diagnosis and apply the proper treatment, when the physicians themselves are unable to accomplish these results. The more efficient the family doctor is, the more ready he is to share responsibility with a specialist.

11 Dentists can help in the control of cancer by informing themselves about the advances in the knowledge of the causes of cancer, especially with relation to the irritations produced by imperfect teeth and improperly fitting plates. They can also help by referring cases of cancer which they discover to physicians skilled in the treatment of cancer in this location. It may be doubted whether all dentists fully realize the help which can be obtained from X ray photographs

in revealing not only the state of the teeth but the condition of the bone surrounding them

12 Medical students should be instructed in cancer by the aid of actual demonstrations of cancer patients, and this to a sufficient extent to give them a good working knowledge of the subject.

13 The most reliable forms of treatment, and in fact the only ones thus far justified by experience and observation, depend upon surgery, radium and X-rays

14 Emphasis should be placed upon the value of the dissemination of the definite, useful and practical knowledge about cancer, and this knowledge should not be confused nor hidden by what is merely theoretical and experimental

15 Efforts toward the control of cancer should be made in two principal directions (1) The promotion of research in order to increase the existing knowledge of the subject, and (2) the practical employment of the information which is at hand Even with our present knowledge many lives could be saved which are sacrificed by unnecessary delay

When a wholesome and sensible survey of a problem as disappointing and important as cancer is, issues from an international conference of this kind, we are surely hopeful that that dichrotic notch of common sense which always follows the hysterical peak of the wave of hyperenthusiasm has arrived, and that those investigators who are engaged in the abstract side of this subject will rearrange their front to conform with this movement

Specificity of Cancer—In a summary of the further experiments with the cancer virus W E Guy^{10/21-26} shows the control charts of his animals that illustrate the specific character of this substance This additional paper will probably result in a better opportunity for workers attempting to repeat his findings to parallel these experiments He has also shown the inhibiting action of acriflavine on the culture of the virus of cancer, and indicates this is as complete as is the action of chloroform

In a series of experiments based on the first paper by Guy, J B Murphy, of the Rockefeller Institute, was unable to attain the same end-results This author was able to produce the same phenomena as those resulting from the cultures of the "specific virus" with anaerobic cultures of chick embryo and rat placenta and claims that there is no necessity of assuming that this substance is either specific or culturable, as stated by Guy

Treatment of Cancer—The year has seen no great advance in the knowledge or treatment of cancer, though there is a distinct movement to increase the efficacy of those measures already at hand

against it that are of value. The endothermy knife as described by G. A. Wyeth ‡ and accompanied by an enthusiastic foreword by Howard A. Kelly offers a welcome departure in the treatment of cancer added to this subject in the last year. This work gives a complete description of the technical side of this form of treatment. Probably the foreword by Kelly is the most significant feature of the whole project, since his experience in this subject is as wide as any surgeon's in the country. The blocking of the vascular trunks in the region of the tumor with the consequent prevention of dissemination of small emboli, during the manipulation, and the antiseptic quality of the knife because of the electrical heat are the factors that make for the beneficial effects of this procedure.

The Blair Bell Treatment of Cancer—Those attending one of the general meetings of the Medical Society of the State of Pennsylvania held in Philadelphia last October were especially well paid by hearing first-hand information from Francis Carter Wood ^{8/1-27} concerning the much discussed question of treating well-selected cases of advanced, inoperable cancer by means of hypodermic injections of colloidal lead. We will let the Doctor largely tell his own story, without the use of quotation marks, except as to his conclusions.

Blair Bell started his work on a scientific basis. He had noticed, what was well known before, that in the district from which most of his material was secured the women were liable to have miscarriages, and on investigation it was found they all came from the white-lead or pottery works where they were exposed to chronic lead poisoning. Bell, being a surgeon well trained in laboratory methods, proceeded to experiment, using pregnant rabbits. He found that if a pregnant rabbit was given a sufficient quantity of lead, it aborted just as did the human female, and that abortion was not caused, as had been previously thought, by contraction of the uterus due to hemorrhages produced in the substance of it, but by actual poisoning of the placental structures, which, under the microscope, were found to be necrotic. This experiment was tried over and over again, and finally he said, "If it will kill placental tissue, it will kill a placental tumor." He watched some time for a chorio-epithelioma, but did not find one. Finally, a woman appeared with an

‡ "Surgery of Neoplastic Diseases by Electrothermic Methods," by G. A. Wyeth. Paul Hoeber, New York, 1926.

enormous carcinoma of the breast with axillary metastases. She was pregnant, and was delivered in the wards. Afterwards she was examined by various surgeons and pronounced inoperable, and after securing her permission to try an experiment, he administered a large quantity of lead. Suddenly the whole tumor disappeared. That was six years ago, and Wood saw this woman in Liverpool a year ago, and she was still well. Blair Bell had sections made of the growth and sent them to a number of pathologists, and everybody agreed that the neoplasm was a carcinoma. Bell and his colleagues thought for a moment that the cancer problem was solved, but, unfortunately, the next series of patients so treated all died, so the cancer problem was not settled.

They then began a very interesting experiment which some men in Liverpool financed. They enlisted the chemical staff of the University of Liverpool, and tried to make a non-toxic preparation of lead by combining it with various other substances. They tried to get the lead into the body without the body noticing it, but found that when the body did not notice it, neither did the tumor. In other words, it was necessary to give a very considerable dose, a dangerous dose, of lead in some form in order to affect the tumor. Finally they were reduced to a preparation made by the simple process, well known to chemists, of taking a solution which contains gelatine in order to keep the lead in suspension, and a little calcium chloride, putting this in a flat dish, and with two lead poles connected the solution thus prepared with a lighting circuit producing a series of arcs.

These arcs carry lead vapor which precipitates in the fluid in the form of a black cloud. In the course of fifteen or twenty minutes the solution is ready for analysis and for use if found to be properly prepared. No one knows just what the composition of this lead is. It must, therefore, be analyzed. The dose is 100 mg of metallic lead. It should not contain particles larger than 0.2 of a micron, which of course are fairly small. It probably contains a considerable amount of hydroxide and carbonate of lead.

The toxicity rapidly increases when the solution is kept, and it is wise to use it fresh. Beside Blair Bell's original mixture, many other preparations have been made. Colloidal lead bromide and

iodide are on the market, but they are highly toxic, and cannot be recommended for use

Prof Blair Bell has been working some six years with his particular preparation of colloidal lead, and has treated some three hundred patients. In about 80 per cent the disease progresses, and such patients gain nothing by the administration of the lead. The 80 per cent that gain nothing is not, however, 80 per cent. of all cancer patients that apply, but 80 per cent of all that he is willing to treat. Cases with renal lesions must be rejected. Those with cerebral lesions must also be eliminated. A hemorrhage in the tumor, of course, would kill the patient. Patients with extensive lung metastases should be excluded. Patients with large abdominal tumors must have these tumors removed first.

When the lead is injected into the veins it is very rapidly distributed about the body to the liver, the lungs, the kidneys, etc., apparently differing in the various animals. The distribution in human beings cannot be judged by the distribution in the rabbit or cat. In the cat the lead is deposited chiefly in the lung, in the rabbit in the liver, but a certain proportion goes to the tumor. If the tumor is too large, enough lead to produce a toxic effect on the neoplastic cells will poison the liver and kidneys. Therefore, large masses must be removed to reduce the bulk of the tumor. The cases Wood has seen have justified this action. There have been some astounding results after such removal followed by treatment with lead.

All cases of squamous-cell epithelioma of the tongue, lip, or cheek must be eliminated. They do not seem to be sensitive to lead. Why, it is not known. It would seem as if the more vascular tumors were the more sensitive, and the rapidly growing sarcomata and the medullary carcinomata seem to respond better than the less vascular tumors.

It is folly to attempt to inject this terrifically toxic substance into a person in an advanced stage of cachexia, or into some frail woman. In other words, patients must be in fairly good condition. People vary enormously in their sensitiveness. Some patients, after the injection of 100 milligrams of lead, go home and back to work, others must be kept under morphine because no food will be retained.

by the stomach, and jaundice may occur which would make a canary bird jealous. So a good many of the cases sent to every person who has any treatment for cancer must be eliminated. Blair Bell properly eliminates all operable cases. He feels that surgery is a tested method with definite results, therefore he will not treat any one who is in any way within the reach of surgery. For the same reason, he will not use this method for post-operative treatment. There are dangers in the treatment to which we are not justified in submitting the patient. At best, only a relatively small proportion of the hopelessly inoperable cases can be treated with any hope of success.

The treatment, according to Blair Bell, is not yet wholly fixed. At first he was rather prone to give 100-milligram doses every week, usually having to transfuse the patient at the end of the second dose in order to relieve the anæmia, although patients vary in this respect. It is not possible to predict what is going to happen, and one should always be prepared to give a transfusion. The anæmia may be rather rapid and very grave. Of late, the practice has been to start out with 25 to 50 milligrams, and watch the patient to see what happens. Usually some fever, nausea, and headache follow. The next day the patient will not eat, but in a day or two he is fairly well. Then at the end of a week he is started on a 100-milligram dose. He will feel a good deal worse as a rule. Success in the treatment depends upon the judgment of the physician of what the patient will stand. This treatment does not mean that the physician buys so much colloidal lead and lets an intern stick in 100 milligrams every week. It means that each case must be tried out. If the patient is highly sensitive, Blair Bell tries to diminish the immediate effect by splitting the dose and giving 25 milligrams every three or four days, but Wood gained the impression, when he was last in Liverpool, that the results were not so good as when larger single doses were given less frequently.

The crux of the problem of cancer therapy is this. There is in the body a new group of cells which are derived from the healthy cells of the body. They do not differ much from normal cells except that they grow a little faster. If these cells are to be destroyed without poisoning the body fatally, a very large quantity of lead will have to be given, approaching the lethal point to the patient's kidneys and

liver The same situation exists with the X-ray Any type of cancer can be cured with this ray, but the patient may not survive the treatment Therefore, X-ray therapy is limited by the position and nature of the growth Some tumors cannot be touched with the X-ray because the patient cannot stand the dose The same thing is true in treatment of certain types of carcinoma with lead

Lead injection has many limitations, but there is one important point—that the X-ray and the lead do not conflict Wood is convinced that when this method is a little further developed, we shall give both X-rays and lead at practically the same time Patients who are nauseated by the lead might as well have a little more from the X-ray They seem to stand it very well Two destructive agents are then working on the cancer-cells at the same time There is one great advantage of the combination The lead is a straight cell poison, and when the metal is eliminated the tumor begins to grow again In other words, the cells of the tumor must be killed With the X-ray the patient can be clinically cured for a long time, at least, without killing all the cells Wood has seen a case of epithelioma of the lip cured by radium, but the scar still contained viable cancer-cells which developed into a new epithelioma thirteen years later The X-ray, then, can heal the lesion without killing all the cells, but so far as our present observations go, this cannot be done with lead Therefore, Wood believes the combination of X-rays and lead will be very valuable because the former damages the blood-vessels and causes a permanent diminution of the blood supply, and thus keeps the cancer-cells starved so that they cannot grow

An interesting illustration of the possibility of such action is a piece of experimental work done in Wood's laboratory by Dr J Heiman If a highly malignant carcinoma is grafted into the centre of a slow-growing fibroma, it will remain encapsulated, but if the carcinoma is removed after several months of residence and grafted into another animal, it will grow rapidly and kill the host in a short time In other words, a highly malignant tumor can be robbed of its proliferative powers by encapsulation and suitable reduction of food supply

One difficulty in using lead is that there is no way of telling whether a tumor of a given morphology will be susceptible If it is

a squamous-cell growth, it probably will not be susceptible, but which tumors will yield and which will not, cannot be determined by the microscope. The same thing, however, is true of the X-ray. This means that tumors have biologic qualities which are not expressed in their morphology. Any experienced worker with the X-ray knows that if three cases of cancer of the breast are rayed, one type will disappear, another will grow, and a third will be entirely uninfluenced. In other words, in the human being, we see three grades of malignant tumors. The same thing is true of lead. In a few minutes after colloidal lead is injected into the body, it is swept into the various organs and cannot be found in the blood. It is probably taken up by the endothelial phagocytic structures of the body. It is deposited in the bone-marrow, the spleen, and the liver, to a small extent in the lungs, and a variable amount is collected by the phagocytic elements in the brain or nervous system. There seems to be no damage to the lungs. There is no evidence of pulmonary thrombosis. The liver, in animals, shows extreme lesions. Blair Bell has not found such focal necroses in human beings, but it may be that the lesions have healed before the patient's death. In animals, the spleen is extensively damaged, and the characteristic structures may wholly disappear after a few injections of lead. The bone-marrow is seriously injured, both in animals and human beings. The human kidney seems more sensitive than that of the rat, for very severe kidney lesions have been shown in some of the fatal cases. So, when this substance is injected into the human body, that body is very seriously poisoned and the beneficial or harmful result rests in the balance between the damage to the body and the damage to the tumor. The lead ultimately is transformed into an insoluble form, carried to the bones, and deposited there as lead phosphate.

The patients occasionally have lead colic, many of them have intestinal distention which is very annoying and painful, and some have severe diarrhoea. The kidneys may show no clinical evidence of irritation, no casts, or albumin, and the quantity of urine and the blood-urea may remain normal, but a certain number have casts, albumin, and blood. In other words, the patient must be kept in a state of lead poisoning for a considerable period, and if the tumor disappears, the case is cured. But if the tumor is not damaged sufficiently, the patient dies of his original disease.

This is a very dangerous and painful type of treatment for most people, and especially those who are sensitive and nervous. Wood hazards the guess that of 100 unselected inoperable cancer cases 1 to 2 per cent. will finally be cured by the lead. That is about what the X-ray will do, and is better than surgery, but we shall not be able to tell until the figures are in at the end of five years of observation. However, we cannot say to the individual patient "Take this lead and it will certainly improve or cure you." One cannot make any promises. There is another difficulty in regard to the treatment, and that is the expense. The lead costs practically nothing, but transfusions do cost, and if the patient has to have five or six transfusions, as is often the case, it means a good deal of money. It also means, in most cases, hospitalization for two months, because the patient is often acutely ill.

Practically, Wood sums up the situation as follows: "A few advanced and inoperable cases of carcinoma and sarcoma have been cured by the injection of colloidal lead. At the present time it is not a method that can be applied by the general practitioner, but must be confined to well-equipped hospitals. The colloid must be accurately and quickly analyzed. It must be made fresh every day. It takes a good chemist to make it, and it takes an experienced physician to avoid killing the patient in the course of treatment. While we have a method in which the possibilities are enormous, yet at present great care must be used. That thirty or forty people are walking around in Liverpool to-day who should have been dead three or four years ago does not mean that the cancer problem is solved. We must still send these patients, when operable, to our old standby, the surgeon, we must still use radium and the X-ray, and probably in time we shall combine both of these agencies with some form of lead."

A visitor ^{10/xii-11} to Liverpool on November 30th, with a small but representative and distinguished group, thus describes his impression:

"The impressions left by the day's program amount to this. A large amount of care and energy is being expended by the Research Association on the study of the effect of lead on the tissues, normal and abnormal, from the pathological, chemical, and toxicological points of view. This work is of a high order and likely to be of permanent value. The Liverpool workers recognize that the therapeutic side of the investigation is still in the experimental stage, and they are making every effort to check varying factors and to establish observed facts.

Every facility was offered to the visitors for seeing the scientific activities of the organization, they were free to handle the specimens and to examine and cross-question the patients. If some of the cases are viewed in an optimistic light, it should be borne in mind that such an outlook is essential if work of this kind is to go on at all, it is for others to supply the keen scrutiny of scepticism. The 49 cases submitted by Prof. Blair Bell form a very remarkable series, and although, taken individually, one might hesitate to pass judgment, taken in the aggregate it is clear that a step forward has been made towards the solution of the mystery of malignant disease, and other workers will have to take into account the results of the treatment with colloidal lead."

Treatment of Cancer of the Tongue — Sir William Milligan, in a paper ^{10/xii-26} on the treatment of lingual carcinoma by radio-diathermy, says that whenever possible immediate radical surgery, with ablation of the lymphatic drainage areas, is always the method of choice, and where this is impracticable an attempt should be made to remove the growth with the diathermic knife, or to destroy it with gradual diathermic coagulation. When these methods are not possible, the unscreened radium tubes, or a combination of the tubes and coagulation, occasionally give gratifying results. In all cases the lymphatics draining the affected area should be carefully dissected out, and in the advanced ones the lymphatics of both sides should be removed. This author advises against the use of preliminary radiation if the lymphatics are to be treated surgically, and recommends that irradiation should follow the surgical procedure, using the unscreened tubes first, and following with radium through the skin, and the X-ray where advisable. Milligan believes that the diathermic cautery knife possesses many advantages over the scalpel, in the surgery of the cancerous tongue. His precaution of the dissection of the lymphatics of both sides is an admirable one, as a careful search of these structures will show that, when the main channels are blocked down to a lymph-node, that functions as a catch basin of any size in the particular drainage area, the flow of metastasis backs up and the reverse flow crosses the natural divides between anatomical drainage basins. This results in metastases that progress across the median line, and extend in a manner that would be directly upstream in the ordinary lymphatic channels.

Protective Processes in Cancer — Uneasy lies the head that wears a crown, but more uneasy, we should think, lies the head nowadays occupied with the many complicated problems involved in studying cancer. Ehrlich Opitz ^{24/i-17} has an interesting article on "Progress

in the Treatment of Cancer," the first of a series which he is writing with Vorlander and Jung. The author's attitude toward the problem of cancer may be characterized as "optimistic," in the sense that he believes that a steady advance in the treatment of individual cases is possible, indeed probable, not, however, in the sense that a specific, or preventive vaccine for the disease as an entity is likely to be discovered. "Almost thirty years ago," says the author, "I expressed the opinion, which is shared by Ribbert, Orth and others, that a large portion of the peculiar occurrences recognizable in the bed of the carcinoma are to be regarded as the expression of protective processes. This, in my opinion, points the way in approaching nearer to the cure of cancer. For it appears by no means hopeless to support and stimulate forces already present in nature, to such a degree that they may be enabled to fulfill their task. We must, of course, not lose sight of the fact that these powers of resistance are in themselves by no means excessive, that they are not alone held in check by superior destructive forces, but are generally completely overpowered by them." And again, "All that I myself have observed, or have gathered from the observation of others, strengthens the view that cancer should be regarded not only as a local, but also as a general, disease." From this point of view, it is natural that the author should welcome any method of treatment—Röntgen rays, radium, lead—which promises to prove an adjuvant in this struggle for "balance of power." Especially does it seem necessary to observe and treat each case individually, in the manner of tuberculosis, by proper diet and environment to strengthen nature's forces of resistance. This point is taken up *in extenso*, and certain dietary rules are prescribed.

Not the least interesting part of the article is that devoted to the search for a suitable formula for injections (generally intramuscular), which has resulted in two fundamentally different series of preparations. The first are the so-called "Anaboles," simple chemical bodies of the nature of olefine, united with a "contact" substance, such as dyes, metals, etc. The second series is at present designated simply by the number "919," as indicating the total of those previously tested and rejected. These preparations have, seemingly, a stronger direct action on the cells of the tumor. In favorable cases,

they bring about very marked processes of recession throughout the entire formation, even of large tumors. The concurrent general effect on the patient sinks into the background. Nine cases, successful and unsuccessful, are reported, with histological reproductions.

Provocative Irritation—A Theilhaber^{24/xii-3} limits himself, apparently, by the title of his article, "The Provocative Theory of Gynecological Affections," to a narrower field than he actually discusses, as his remarks are extended to include not only menorrhagia and metrorrhagia, but also myoma and cancerous affections of the uterus. Irritation, he says, is undoubtedly an important cause in the genesis of cancer, but not in the manner understood by Virchow, namely, that of consecutive increase of proliferation of the epithelium. This leads to thickening of the epithelium and the formation of warts. The decisive factor in cancer, namely, the invasion of the connective tissue by the epithelium, is the result of an abnormal condition of the latter, of reduced power of reaction, and of insufficient cellular immunity of the connective tissue. These changes in the connective tissue are at times due to exaggerated irritation, at times to the lack of physiologic stimulation of the connective tissue, generally to a combination of these factors, together with hypofunction of the lymphocyte organs. Weak and moderate stimuli tend to the recession (cure) of cancer, especially effective is the stimulus of the short-wave Röntgen rays and of radium. They penetrate deeply and cause deep infiltration. Powerful stimuli bring about extended destruction, it is true, but weaken the organs of resistance, and thereby increase the tendency to relapse. The author's method of after-treatment following operation is based, likewise, on the principle of stimulation, whereby the creation of protective elements against the disease is increased. Small Röntgen doses are used in connection with diathermy, generous and frequent bleedings, and the injection of spleen extract. The latter acts also as a kind of passive immunization. Since adopting this method, says the author, the number of recurrences following operation has distinctly decreased. Likewise, in a number of cases in which, for technical reasons, the entire cancerous growth could not be removed, there has resulted radical cure, proof that the procedure does not alone diminish the disposition to cancer formation, but also leads to increased resorption.

Cancer of the Oesophagus—De Nabias^{12/vii} describes a new and potentially important technic in the treatment of cancer of the oesophagus with radium. At autopsy, says the author, he was impressed by the great disproportion often observed between the lesion of the oesophagus and the enormous surrounding mass found behind and around the tube in the posterior mediastinum. This suggested that the tubes of radium placed in the oesophagus were quite inadequate for treatment of a lesion of such volume. By attacking the cancer from the rear, anteriorly and centrally, simultaneously, he was enabled to bring sufficient radium into action to meet the requirements of the case. The result of this manner of treatment, in a woman of fifty-three years, with a circular, histologically verified neoplasm, together with a large mediastinal mass, was apparent cure, five months after start of the treatment and four months after its termination.

CEREBROSPINAL FLUID

The Value of the Routine Examination of Cerebrospinal Fluid—B. L. Crawford and A. Cantarow,^{2/vi} of the Laboratories of Clinical Pathology and Physiological Chemistry of the Jefferson Medical College and Hospital, state that the total quantity of cerebrospinal fluid is approximately 120 c c. It is replaced every five to six hours. The greatest part is absorbed into the blood-stream, mainly because of the lower pressure in the venous blood and its higher osmotic tension. Normally there exists a constant balance between reproduction and absorption. A parallelism was found between the concentration of reducing substances in the spinal fluid and that of glucose in the blood. In a series of six of the authors' cases of diabetes mellitus simultaneous blood and spinal fluid sugar determinations were made. The greatest value of sugar determinations was found to lie in differential diagnosis of tuberculous meningitis from epidemic encephalitis. Upon standing, normal and tuberculous fluids show a decrease in hydrogen-ion concentration, which is due to the escape of CO₂ from the fluid. The hydrogen-ion concentration of the fluid of epidemic meningitis, on the other hand, shows a marked increase which is due to the formation of the non-volatile lactic acid. The authors believe that this is the result of the destruction of the glucose which rapidly disappears from such fluids. This they interpret as

an indication of a slight degree of glycolysis with resultant lactic acid formation in tuberculous meningitis, which is, however, much less than that in epidemic meningitis.

With the technic recommended by Foster it was noted that the density of the precipitate obtained during the process of protein precipitation preparatory to the sugar determination paralleled that observed by Noguchi's method of globulin content estimation. In more than 200 cases the butyric acid method of globulin precipitation was used as a control. One cubic centimetre of spinal fluid is diluted with 7 c c of distilled water, to this are added in turn 1 c c of 10 per cent sodium tungstate and 1 c c of two-thirds normal H_2SO_4 , mixing thoroughly after each addition. Normal fluids yield no precipitate, at most, a slight turbidity, while increase of protein is readily perceived. The series studied consisted of 210, 67 of which were normal adults. Their globulin was not increased and the sugar concentration ranged from 40 to 66 mg per 100 c c, the average being 57 mg. These figures digress from those found by other writers. In a group of 11 children the normal average was found to be from 25 to 30 mg, higher than in the adult. The ratio of spinal-fluid sugar to blood-sugar remains approximately 1 to 2, except in changes of the central nervous system. The membranes of the body, including the surfaces of all cells, act essentially as semi-permeable membranes, and are subject to substances passing through the laws of filtration and diffusion. The surfaces are but partially permeable to glucose and those lining the choroid plexuses acquire a tendency toward increase of permeability when damaged. From this, it is inferred that disease causing injury to the cerebro-spinal vascular system results in an increase of sugar content of the spinal fluid.

In epidemic encephalitis (8 cases) the sugar concentration ranged from 71 to 106 mg per 100 c.c. In 41 cases of lues it ranged from 30 to 110 mg per 100 c c, in marked increase of intracranial tension, especially in brain tumor (7 cases) from 71 to 110 mg per 100 c c, in functional mental disorder (57 cases) 71 to 94 mg per 100 c c. "The essential cause of hyperglycorrachia is increased permeability of the protective barrier of choroidal epithelium and cerebrospinal capillary endothelium. Conditions causing hyper-

glycorrachia are those that have essentially vascular pathology, especially encephalitis and certain forms of syphilis of the central nervous system."

CONVULSIONS

Fasting as a Cause of Convulsions—Hugh Josephs,^{1/11} of Baltimore, puts forth a theory on the clinical manifestation of convulsions. He was led to accepting an interrelation between fasting and convulsions because the attacks were quite generally noticed in the early morning, and in several instances in the evening, in children who had gone to bed without their suppers, or after they had vomited their meals. Short fasting periods seemed to produce them. The attacks were similar to those which develop during the onset of an acute infection. The blood-sugar concentration was studied in normal children and those suffering from convulsions after short periods of fasting and it was found that it was lowered. The convulsions were seen in association with recurrent vomiting hypoglycæmia, and acetonæmia. Acetone bodies were found early in the attack. Though fever accompanied most of the convulsions, it did not seem indispensable for their occurrence.

DIATHERMY

G. Kolischer and A. E. Jones^{19/7-22} advise the use of medical diathermy, a regional heating of bodily structures, between physiological limits, by means of high-frequency currents, in toxic nephroses, and glomerulonephritis. The latter condition, which they explain as a blockade of the glomeruli involved, with a resulting ischæmia of the kidney, will answer to the hyperæmia produced by the localized heating of the kidney and perirenal tissues, with a prompt improvement of the embarrassed circulation. This is demonstrated, by the prompt increase of the urinary output, after the treatment, with an increase of the liquid blood, and the number of small coagula, in the urine. The use of the diathermy is advised after a decapsulation, in order to produce a congestion in the area where the new vessels are to be formed, and the effectiveness of this procedure is noted in the increased flow and redness of the serum from the point of drainage. The addition of this procedure to the usual renal regimen seems to aid in the reduction of the œdema within the kidney, as is evidenced by the changes in the urinary output. The increase of the

blood in the urine indicates an improvement of its circulation and removal of the exudative block, within the organ which is augmented by the internal œdema. The use of the diathermy is nothing more nor less than the application of the Bier treatment to areas, impossible to reach before the discovery of this process. Its value in pelvic inflammation, in joint rheumatism, and in fact in any type of localized sepsis, especially those that are accompanied by over-repair and failure to organize, is inestimable.

DIPHTHERIA ANTITOXIN

Anginas and Diphtheretic Paralysis Treated with Massive Doses of Antitoxin—Lereboullet, Gournay and Pierrot^{17/2} discuss at length the present status of the treatment of the anginas and diphtheretic paralysis, in an issue of the periodical devoted entirely to diphtheria. They emphasize the satisfactory results obtained by them at the Hôpital des Enfants Malades, Paris, by the use of massive doses of serum, exceeding greatly the quantities hitherto usually employed in France. According to these authors, serotherapy must be not only intensive, but considerable doses of antitoxin must be injected within a minimum period. According to the age, weight and size of the patient, and to the gravity of the local and general conditions, the amount of serum employed varies from 100 to 250 c c per day. Naturally, in cases of paralysis, the only rôle played by serotherapy is in aiding in the cure of diphtheria and thus permitting the subsequent evolution of the paralysis, which would otherwise have been cut short by death. As a preventive measure against paralysis, however, intensive serotherapy has proved so effective that frequently several weeks pass, say the authors, without a single manifestation of this phase of the disease being encountered in the hospital where this mode of treatment is employed.

Value of Purified Sera—In regard to the so-called "purified" sera, to which special attention is called by Ramon in the same issue, the authors of the article under consideration find that the ordinary serum possesses a superior activity in corresponding dosage. Its action in the elimination of false membranes appears to be more rapid, and it therefore remains the agent of choice in malignant diphtheria, especially in view of the fact that in corresponding doses the purified serum, despite claims to the contrary, likewise gives

rise to accidents. On the other hand, purified serum, for which the essential indication is in seroprophylaxis, is the remedy of choice in subjects with anaphylaxis already developed from previous treatment, and in those predisposed to accidents from injections (asthma, eczema, migraine, etc.), and is destined to supplant the ordinary serum in the treatment of common diphtheria.

ECLAMPSIA

Howard F. Kane,^{80/1v} from the Obstetrical Service of Freedman's Hospital, of Washington, is of the opinion that every theory offered on the cause of "convulsive puerperal toxæmia" should be carefully weighed. At present "it seems true that the toxin of eclampsia originates in the product of conception," from material eliminated by the bowels and kidneys, which cause profound toxæmia when digestion is inadequate in consequence of sluggish bowels and high protein diet taken by the mother. Combating formation and retention of toxins in the alimentary tract has been the most successful form of treatment. There are two types, one due to primary renal inadequacy and the other, true eclampsia, with changes in the liver and nephritis as a secondary complication. There are two distinct schools of obstetricians, one believing in removal of the products of conception, the other treating the toxæmia and leaving the voiding of the uterus—slightly assisted—to nature. Statistics show that mortality following cesarean section in eclampsia is over 30 per cent, conservative treatment shows but 10 per cent. mortality. Morphine is used in Freedman's Hospital, one-half grain hypodermically at the first convulsion, one-quarter with each succeeding convulsion till respirations fall to 10 a minute in consideration of temporary asphyxia and cardiac dilatation caused by the convulsions. After each convulsion a few breaths of oxygen are administered to combat cyanosis. The stomach is washed and the colon irrigated with a 5 per cent sodium bicarbonate solution, followed by introduction of 2 ounces of magnesium sulphate through a tube. This treatment is given only after the patient is narcotized by morphine. Venesection is made where the blood-pressure is above 170 mm, withdrawing 600 to 1000 c.c., or less, till the blood-pressure falls to 150 mm. An attempt at regenerating the liver is made by using 500 c.c. of a 10 per cent. glucose solution intravenously after venesection. Acido-

sis is combated by retention enemata of 6 ounces of glucose and soda, 5 per cent. solution of each, every four hours. Slow delivery is hastened by forceps or version after full dilatation of the cervix. Cesarean section is resorted to if blood-pressure remains high, and coma and convulsions continue, in spite of treatment. The ten patients treated conservatively survived.

ENCEPHALITIS EPIDEMICA

Heinicke^{24/1x-1} gives the results of his experience with this baffling disease, in the institution for the blind and feeble-minded at Chemnitz, Saxony, as he modestly says, "with all reserve." The conclusions reached by the author may be summarized as follows: (1) In the acute form of epidemic encephalitis, convalescent serum is the only more or less dependable remedy with which appreciably to reduce the frequency of lethal results and to prevent the otherwise inevitable chronic degenerative condition. Even in the so-called "pseudo-neurasthenic" stage, the treatment is effective. In the lack of convalescent serum, electro-collargol, trypanflavin, and especially sodium salicylate may be used. (2) Chronic cases, likewise, may be alleviated, although results are here far less favorable than in the acute stages. (3) Success in the treatment of chronic cases is in many instances limited to the disappearance of the symptoms already manifest in the acute stage, or of the disposition to recurrence, with establishment of a stationary condition of the disease. Of the chronic cases, the unilateral are more easily influenced than the bilateral. (4) Prognosis appears to be most favorable as regards psychic disturbances, especially those of pseudo-psychopathic conditions in children and youthful individuals. These cases, however, call for treatment extending over years. (5) Treatment must be specialized and institutional. It can be carried out in general only in institutions with special facilities. (6) In view of the importance of rendering the disease stationary, the immediate transfer of patients to specialized treatment cannot be too emphatically urged. Any delay increases the probability of irreparable injury.

EPHEDRINE

The Therapeutic Action of Ephedrine—Ephedrine, the active principle of Ma Huang, a plant growing in China, is an alkaloid obtained from the root and stem of *Ephedra vulgaris Helvetica*.

Although this plant has been a popular remedy in China and Russia for many centuries, the alkaloid was not separated until 1887, and its use in scientific medicine has been much more recent, it having been especially studied at the University Medical College of Peking Pollak and Robitschek^{33/vi-24} have investigated the action of this alkaloid in a large number of cases and find that it resembles that of adrenalin. It raises the blood-pressure, is a mydriatic, and reduces the blood-sugar content. Applied to the skin its action is different from that of adrenalin, as it has a stimulating effect. While its effects on the end organs of the sympathetic nervous system are like those of adrenalin, it has a more direct action on unstriated muscle-fibres. Its effects are more persistent than those of adrenalin, especially in regard to rise in blood-pressure. Ephedrine may be sterilized without destruction of its properties, it is much more stable than adrenalin and may be administered by mouth. It has been found to be of value in circulatory failure after operation, and has proved an efficient substitute for adrenalin in bronchial asthma. In some cases palpitation, tremors and profuse sweating have occurred after internal administration of 0.1 gm. of ephedrine in apparently healthy subjects. Many asthmatic patients experience great relief after the administration of ephedrine. Its use is also indicated in nervous patients who have unstable vasomotor systems. Twenty drops of a 10 per cent. solution will terminate an hysterical attack.

Treatment of Asthma by Ephedrine — William S. Thomas,^{2/v} of St. Luke's Hospital, New York, believes that ephedrine, a substitute for epinephrine, will eventually be employed extensively in asthma. In the large majority of instances ephedrine relieved the asthmatic paroxysms or kept the patient free from discomfort while the drug was being used as a preventive. It is not always effectual, however, and in some instances it produces unpleasant effects. Although no evidence led to anticipation of untoward effects in long-continued administration it is not yet definitely known whether it may do so. The blood-pressure was not at all, or but inconsiderably, influenced, however, in a girl, aged sixteen, with giant urticaria and hypertension, transitory arterial tension from 160/100 mm. to 200/150 mm. was seen. The drug was given by mouth,

though hypodermical injections are feasible and naturally more rapid in effect. The dose employed for adults was usually 50 mgm., which was reduced when tremor or palpitation arose. In some instances capsules were used, and a 3 per cent solution as a nasal spray. In one of the 22 patients treated with the drug, aged fifty-three years, eight injections of epinephrine had been used daily for a year. While taking ephedrine a diminution of the sphincter vesicæ reflex caused the patient to "forget" to void urine for twenty-four hours, but with no evil effect after urination.

The Rectal Administration of Epinephrine—William O. Menninger and Harlan S. Heim^{2/xi} have made 31 observations on the effects of rectal administration of epinephrine, noting at stated intervals the effect on blood-pressure. In 64 per cent of the cases there was a blood-pressure rise of over 10 mm. of mercury, and in 50 per cent a rise of over 20 mm. The maximum effect was reached in an average time of 40 minutes after the injection. The blood-pressure elevation continued for 45 minutes longer. The pulse was slightly decreased or remained constant in 18 cases, while it was increased in 13 instances. Among other systemic or local effects most frequently observed were tenesmus, desire to urinate, abdominal cramps, sweating, epigastric distress and relief of respiratory difficulties in asthmatic patients. It was found, however, that the rectal absorption of epinephrine in relatively large doses is unreliable. It produced little or no effect in 50 per cent. of the cases. Where it was effective, while much slower in reaching a maximum, the effect persisted over a much longer period of time than when the drug was given hypodermically. The authors believe that this method of administration should be of advantage in cases requiring a prolonged effect and repeated doses of the drug, as in asthma or in Addison's disease.

ERYSIPELAS

Streptococcus Erysipelatis Toxin and Antitoxin—H. A. Singer and Bertha Kaplan^{10/xii-25} conclude that the sterile toxic filtrate of the broth culture of these organisms possesses the properties of a true toxin. This toxin is capable in man of provoking the formation of an antitoxin. They find that the artificially produced immune serum or antitoxin has a higher value clinically than convalescent erysipelas serum. The antitoxin produced by the injection of the toxin alone

seems to compare favorably in its protective qualities with sera produced by the injection of the organisms. They conclude that hemolytic streptococci of erysipelas and scarlet fever are not absolutely biologically specific.

Anti-serum of Erysipelas—Clinical trials in 60 moderately severe cases of erysipelas by Konrad Birkhaug,^{19/v-8} at the University of Rochester, demonstrate that 100 c.c. of an unconcentrated erysipelas anti-streptococcic serum or 15 to 20 c.c. of the concentrated serum will, when administered during the first three days of this disease, cause a prompt improvement of the symptoms, with a sharp fall in temperature and pulse, and a rapid subsidence of the acute skin lesions. When administered later this serum produces a general improvement in the patient's condition, though the reaction is not nearly so beneficial as when administered early. Intradermal injections of the toxin afford a measure of the neutralizing action of the therapeutic dose. These authors conclude that the etiological agent of this disease is of a specific character. The serum is prepared in the horse in the manner described by Dochez for the production of scarlatinal anti-streptococcus serum.

ERYTHEMA ARTHRITICUM EPIDEMICUM See HAVERHILL FEVER

EUGENICS See also HEREDITY

Racial Decadence—The recent visit of the Very Rev W R Inge, D.D.,^{10/xi-27} Dean of St. Paul's, of London, to America, has put him down in the minds of most people as an outstanding pessimist. But it is well from time to time to have even the optimist meet the pessimist in his own slough of despair and foreboding of the future. Before the Royal College of Physicians on November 19th, Sir John Rose Bradford presiding, the Dean delivered the David Lloyd Roberts Lecture and took for his subject racial degeneration, discussing this interesting subject in a border-land manner between strict science and practical social hygiene. While Galton was especially interested in racial improvement, the positive side of eugenics, he chose racial decadence for his topic because at present negative eugenics appeared to him far more important than the positive variety and stated that natural selection had almost ceased to operate in England, and unless some rational substitute was provided for it, nature would punish English men and women for interfering with

her methods of social hygiene without providing anything to take their place. In the human species there have been three stages of evolution. Increasing complexity of bodily structure, increasing intelligence, and increasing social organization. While man had been a distinct species for probably more than a million years, anything like specialization was a matter of the last ten thousand years or so, and this was indeed a very short time for him to adapt himself to revolutionary changes in his habits, wild animals being better adjusted to their environment and more free from disease than man. It would seem at the present time that the foot was altering, the little toe decreasing and the big toe increasing in size, the teeth were diminishing in size and strength, baldness in middle life was perhaps increasing, and something appeared to be happening to that apparently useless organ, the appendix. Eyesight was deteriorating rapidly. We might some day have a generation which could neither walk nor write, relying on the automobile in the one case, and the typewriter in the other. It seemed to the speaker that it was doubtful if human intelligence had advanced during the last five thousand years, expressing little doubt but that the Greek was a superior being. Civilization was mainly the result of accumulative knowledge and experience, each generation standing on the shoulders of the last, and had the chance of climbing higher from that point, or as we have put it a number of times, of toppling over. Most of our acquisitions were in the custody of very few persons. Some of them were trade secrets, others could be mastered only by long years of application, and this explained why the arts and structure of civilization had occasionally disappeared. Some calamity might break the tradition, such as has occurred in Russia, which, when it recovered, would have to go to other countries for the arts and sciences which had been almost extinguished at home.

It could not be disputed that those qualities which were once essential to progress had no longer the same survival value under civilization of the modern type. An industrialized civilization skimmed off the cream in each generation and then threw much of it away. In some societies a highly cultivated minority had flourished and produced achievements which were the wonder of posterity, but the remainder of the population were still quite uncivilized and

uncared for. On the other hand, unlimited competition exhausted the competitors, and whether voluntarily or involuntarily, sterilized them. So severe was competition in the United States at the present time, according to Inge, that 1,750,000 policy-holders of insurance companies gave only an average duration of life of forty-six years for males and of fifty-two for females. But in all the higher faculties competition was not the chief motive factor. The plan of developing to the utmost a small selected class had not proved that equally good results might not have been obtained by other methods involving less injustice.

The Dean then asked the question whether civilization was working towards the degeneration of the national English stocks. It was necessary here to take into account not only the parasitism of persons or classes on the community, but the new danger that human beings might become parasitic to the machines which they had made for their own use and which had ousted them from natural human occupation. Apart from the machine they would be helpless, even in the presence of abundant material. A company of such men, left to themselves without their machines, would most likely perish. Sometimes the diseases which were supposed to be hereditary could be eliminated by scientific treatment as by the Swiss, freeing their valleys from goitre which had been endemic ever since the time of Juvenal. It used to be supposed that Europeans were constitutionally unable to keep their health in tropical climates, but it seemed now that in the absence of tropical diseases, such as malaria and yellow fever, which were being brought rapidly under control, even northern Europeans could live healthily in the tropics. Still, when all had been said in favor of concentrating attention on the environment, the best authorities were unanimous that nature was far more important than nurture, nature, according to Karl Pearson, being at least five times—perhaps even ten times—more decisive than nurture.

Transmission of characters was now seen to be far more complex than was once supposed. It would also be found, if the literature of the subject were studied, how frequently striking pedigrees, such as the Bachs in music, and the Darwins in science, made their appearance and that such pedigrees should be studied, not only as to the five-talent members but also as to the two-talent men. The history

of many professional families would be well worth tracing in the minutest detail. As an example, it was stated that only thirty-three pilgrim fathers founded families in America, yet the names of some of the most distinguished of their descendants included many Presidents of the United States, and other distinguished men in American politics, arts, science, and letters. Nearly half the distinguished men in America have descended from these thirty-three pilgrim fathers.

The lecturer then dwelt especially upon the falling birth-rate among the professional classes. The higher races and classes were using the resources of scientific knowledge to reduce the death-rate of the inferior and the birth-rate of the superior. This relative sterility of the professional classes is a new thing as is the sharp decline in the infant mortality of the slums, as was also the feminist movement, which, according to some, was the most dangerous factor of all because it made the most intellectual women decline motherhood. Beyond all question the classes best endowed intellectually, and, in England, the best endowed physically as well, were passing into a relative or even an absolute decline. Taking England as a whole, the lowest birth-rates were in the families of members of the medical profession, teachers, and ministers of religion, yet no more desirable parents could be found than the members of these professions. The propagation of bad stocks was injuring the national stock to a marked degree, the feeble-minded, according to Tredgold, being about 50 per cent more prolific than the normal. It is not generally known that although the death-rate had declined rapidly, this decline had been entirely in the earlier periods of life. The expectation of life at sixty was no higher than it was two generations ago. From the ages of forty-five cancer began to levy a cruel toll on both sexes, while it would seem that the national physique of the Continent was improving, the stature of Danes having arisen appreciably during the last fifty years, and the average height of the Dutch during the last half of a century. In France the average height of women was said to have increased by 3 cm. during the last eighty years, while according to the *English Review* a marked deterioration had occurred among the people of England.

Nevertheless, Inge was inclined to hope that it was not too late to stop the mischief, which had not yet had time to go very far.

"We must hope for the generation of some social antitoxins. We were not yet a degenerate people. We were a race to which any man might be proud to belong. But society was not at present in a healthy condition, and unless the problems of racial decay were taken in hand it might be too late. All they could do at present was to persuade their countrymen what were the pressing problems—so very different from those in which politicians interested themselves. The great medical societies could do much if they would speak out. They did not realize how eager the public would be to listen to them. The modern man might deny that he had a soul, and forget that he had a mind, but he was acutely conscious that he had a body, and accordingly he had a great respect for the doctor." Personally, the Dean wished in conclusion that the medical societies would testify, for when they spoke he nearly always agreed with them.

Viscount Cane, the Lord Chancellor of England, replying to the "Gloomy" Dean's recent book, before the Author's Club of London on November 2d, advised the use of work, and then more work, as a panacea for present-day evils and those that threaten in the near and distant future. Osler's dictum of living in the present by the day's work, and the early Christian practice of taking no thought for the morrow, are variations based on experience which make life well-worth living, whether this be done selfishly merely for one's own bodily comfort or altruistically, for the common weal.

FEVER

Fever in the New-born Infant—F. L. Adair and Chester A. Stewart,^{1/v1} of the University of Minnesota, made observations at the Swedish hospital at Minneapolis on 817 full-term infants in 1921 and January, 1922, with a daily record of the naked body-weight and a determination of the amount of milk obtained at each nursing at four-hour intervals. Rectal temperature was taken every four hours during the first four days of life and once daily thereafter, 99.6° F. was considered the normal temperature. Of these 817 infants, 99 (12.2 per cent) developed fever during the first week of life. The minimum of 2.4 per cent of cases was seen during March, 1921, and January, 1922, and the maximum of 34.0 and 27.7 per cent during June and July, 1921. Of the 99 babies with fever 87.8 per cent occurred from May to September, 1921. This

was an unusually warm period with temperatures from 91° to 98° F. Of 321 babies born during these hot months, 24.3 per cent developed fever. External temperatures, especially those above the usual winter room temperature of 68° to 72° F, have a definite influence on the frequency of the occurrence of fever in the new-born infants. The average duration of the fever was 2.2 days—the majority occurring on the third and fourth days of life, with variations to 105.2° F. It becomes apparent from the study that dehydration from subnormal fluid intake and excessive loss in weight is characteristic of infants who have fever during the new-born period.

GONORRŒA

Anti-gonorrhœal Vaccination—An account of giving 202 patients anti-gonorrhœal vaccine is described by Duvergey, Dax and Ramarony^{11/vii-19}. In 175 instances they used the stock vaccine of the Pasteur Institute, in the other 27 cases auto-vaccination was the method employed. The cases were divided into four classes: Acute, subacute, chronic, and those with local or general complications (prostatitis, epididymitis, cystitis, rheumatism, arthritis). Results, likewise, are grouped under four heads: Aggravated, stationary, improved, cured. The results showed that in acute urethritis the value of the method is negligible (two cures, four aggravations). On the other hand, 26 and 28 per cent of cures, respectively, were obtained in subacute and chronic cases. Auto-vaccination was reserved for the longest established cases, and showed 31 per cent. of cures. The authors' general conclusion is that the method is unsatisfactory when used alone, but that it is valuable as an adjuvant to local treatment.

HARRISON NARCOTIC LAW

The *Weekly Roster and Medical Digest*, the official organ of the Philadelphia County Medical Society of Pennsylvania, has just issued this warning to its members: "Informers (usually drug addicts) are frequently sent to physicians' offices to obtain evidence in the form of narcotic drugs, or an order (prescription) for same. Be on your guard against unscrupulous persons who misrepresent facts about their maladies. Some addicts are so adept in the art of dissimulation that they easily deceive physicians and surgeons by feigning the symptoms of some disease, e.g., neuritis, biliary colic, hæmoptysis, etc."

HAVERHILL FEVER

The Etiology of Haverhill Fever—Frederick Parker, Jr, and N Paul Hudson state that the original epidemic of Haverhill fever occurred in the city of that name in Massachusetts in January, 1926. The fever had an acute onset with toxic symptoms, chills, vomiting, malaise and headache, was characterized by an eruption involving especially the extremities, of a blotchy, somewhat measles-like character, which tended to form petechiæ, and was accompanied by multiple arthritides, of moderate and severe intensity. The disease was traced to a supply of unsterilized milk from three different farms, all delivered through one handler. Positive blood-cultures were obtained from eleven of twenty-one patients, and infected knee-joints of two gave pure cultures of the organism. These two patients also had positive blood-cultures, and their sera contained antibodies for the organism. Frederick Parker, Jr, and N Paul Hudson have labelled the organism *Haverhillæ multiformis*, creating this new genus in the family *Mycobacteriaceæ* under the order *Actinomycetales*, according to the Bergey classification. It is rod-shaped, filamentous or thread-like, shows decided tendency to branch, varies markedly in its shape, showing swelling and other irregularities, is not motile and requires complex proteins for its cultivation. It is Gram-negative and non-acid fast. Enlargements do not take the spore stains and capsules and metachromatic granules are absent. This organism has been clearly established as a new species, has apparently been definitely proven to be the cause of the epidemic in question and, though the serum in the suspected herds agglutinated the organism, the source and method of transmission of the infection could not be found.

Edwin H Place, Lee E Sutton, Jr, and Otto Willner,^{9/11-18} of the South Department, Boston City Hospital, who also studied this fever, tentatively named it Epidemic arthritic erythema. Differential diagnosis included erythema infectiosum of Escherich, rheumatic fever, influenza, erythema subitum, dengue and typhus. In the clinical picture the acute onset with toxic symptoms is dominated by chills, vomiting, discomfort and headache. The rash which next develops involves the extremities and is blotchy, somewhat morbilliform, tending to petechiæ. Accompanying it is multiple arthritis which is often severe. The joints are involved

in from one to four days Coughing and diffuse redness of the throat was seen in some cases Desquamation was seen in several of 60 cases brought to attention The organism is Gram-negative, rod-shaped, appearing as long filaments in fluid media and shorter on solid media Pleomorphism is marked The threads often show oval or spherical enlargements

HEART

The Electrocardiogram in Coronary Thrombosis—In 1909 Eppinger and Rottberger found that the left ventricular muscle of a dog's heart was destroyed after they had injected a silver nitrate solution into the cardiac walls This destruction produced a peculiar and changing alteration in the elevation of the *T*-waves which branched directly off from the descending limb of the *R*-wave The *T*-wave gradually changed, the *R-T* branch descending till it approached isoelectric, with final reappearance of isoelectric *R-T* interval Smith, in 1920, found that the change in the *T*-wave was greatest in those dogs, the blood-supply of which to the apex of the heart was most disturbed, and where two or more branches of the ramus descendens and the circumflex sinistra were ligated Samajloff applied his electrodes directly on the apex and base of a frog's heart He found that pinching or cutting the heart-muscle at its apex produced an elevation of the *T*-wave and a branching off directly from the *R*-waves The return to its previous normal type depended on the depth of the cut In their own patients Norman E Clark and F Janney Smith^{18/viii} found the electrocardiograms of coronary thrombosis the same cyclic transition or variation of tracings and the same elevation of the *T*-waves branching directly off from the *R*-wave or *S*-wave The charts derived from this study of electrocardiograms show that those which have been considered as indicating coronary thrombosis in the human find their close counterpart in curves showing the effect of experimental injury to the muscle of the left ventricle The forms of electrocardiograms presented as indicative of coronary obstruction evidently occur shortly after the injury and, with the passage of time, this electrocardiogram is replaced by one which is not necessarily characteristic

The Pre-clinical Stage of Heart Disease—Following the idea of preventive medicine in heart disease, S Calvin Smith describes

the pre-clinical signs of this condition. He includes in the five most important pre-clinical symptoms, "shortness of breath, heart hurry, chest oppression, chest pain and physical fatigue, all attendant on moderate or accustomed effort." The presence of these symptoms should be a signal for those minute routine heart examinations which will reveal underlying cardiac and vascular disease. Acute indigestion is particularly stressed as a warning too often ignored of the approaching heart disease. Among the pre-clinical physical signs are mentioned intermittent pulse, enlargement of the transverse diameters, muffling of heart-sounds after physical effort, and the failure of the beat to return to normal rate after the usual post-exercise rise. Other early physical signs are râles at the base of the left lung, posteriorly, anæmia, thyroid enlargement, vasomotor disturbances, and dizziness on sudden changes of posture. All of these signs warrant a careful inspection of the patient's habits of hygiene, of those areas known to harbor foci of infection, and of his general condition, with a view to unearthing such constitutional dyscrasias as lead to heart disease.

The Treatment of Cardiac Pain.—The surgical measures for the relief of cardiac pain, eight in all, most of which give relief only in a small percentage of cases, are discussed by G. I. Swetlow and S. P. Schwartz.^{19/7-20} Many of these procedures develop pain usually of a severe nature in some other area, while the method described is claimed to be absolutely safe as to immediate effects and efficacious in its results. Most pain impulses reach the brain through the dorsal root ganglia, basing their procedure on this fact, these authors map out the area of pain on the chest, and inject 85 per cent. alcohol into the dorsal root ganglia which supply the area of the pain. In a carefully worked out set of case histories on this type of operation, a high degree of success is reported in these patients so treated.

The Abuse of Rest in Cardiac Therapy—William D. Reid,^{2/1-3} Evans Memorial and the Department of Medicine, Boston University School of Medicine, sounds a warning against too frequent use of the prescription of strict rest abed for the cardiac patient. He asks, who does permit the use of joints soon after convalescence from articular rheumatism?—but not of the heart-muscles. The main

therapeutic problem is the combating of the infection. The heart will not suffer additional harm if a gradual resumption of activity is permitted, providing untoward symptoms are absent. "Periodic contraction is a physiologic property of cardiac tissues and it is yet to be proven that the use of the body short of the production of symptoms of heart failure in any way interferes with the process of repair in the heart-muscle." The physiology of the circulation comprises more than the heart action alone. The most rigid application of rest cannot stop all activity of the heart. Children especially are sensitive toward any cardiac discomfort, therefore, as long as they enjoy activity one is safe in letting them continue it and in the adult the breeding of an idea of invalidism must be avoided and congestion of the lungs and hypostatic pneumonia may be the result of too rigid immobility. It is a serious matter to expose a man to the possibility of losing his position by rest in bed.

Intradermal Salt Solution Test in Cardiac Disease in Children—Harry C. Olmsted,^{6/11} of Seattle, made tests to determine the clinical significance to be attached to the time required for the disappearance of œdema, produced by intradermal salt solution. In two patients tested after death the solution disappeared practically as rapidly from the œdematous parts as during life, which is interpreted as a proof that blood circulation is not necessary for the test phenomenon. Forty-four children, ranging from four to twelve, suffering, all but one, from acute or chronic rheumatic heart disease or acute rheumatic fever and chorea, were subjected to this intradermal test. The salt solution which had been injected disappeared within the normal time of about 50 minutes, in well-compensated non-toxic cardiac disease, acute rheumatic fever and chorea. The time was shorter in cardiac decompensation with œdema in œdematous and pre-œdematous regions and shortest in the dependent parts of the body. The test does not enable the practitioner to predict a break in compensation as the decrease in required disappearance time, in some instances, did not precede other clinical signs of impending decompensation. An unfavorable prognosis may be made on the strength of this base in generalized toxic cases. The disappearance time which marked the toxic cases became more like that seen in cases where cardiac decompensation developed.

Prodromal Symptoms in Angina Pectoris—In an analysis of 82 cases of angina pectoris, Morris H Kahn ^{2/viii} found 25 or 30 per cent to have presented prodromal symptoms. Ten of the patients complained of a substernal burning sensation or attacks of epigastric pressing or burning pains. In a few the symptoms of burning manubrial pain and epigastric distress were combined. In 4 per cent. of the cases typical attacks of angina were preceded by symptoms which were not alone characteristic of angina, such as sudden weakness, faintness, darkness before the eyes, falling to the ground without loss of consciousness and without pain in the chest. In subsequent attacks pain became the dominating feature. In one case the attack occurred eight years before the attack of angina pectoris, in the interval there was continued burning pain in the manubrium and dyspnoea after moderate exertion, indicating that a pathological process had been going on for a long time. In seven cases the prodromal symptoms consisted of dyspnoea, palpitation and fatigue on moderate exertions, with other signs and symptoms indicating myocardial impairment, all coming on before the angina pectoris developed. It therefore seems evident that the disease process, which eventually produces angina pectoris, is a prolonged one and that there is involvement of the aorta and coronary arteries, long before the angina becomes manifest. In view of these facts it is important in the prophylaxis of angina pectoris that careful attention be given to premonitory symptoms such as those mentioned above.

Some Points in the Prognosis of Auricular Fibrillation.—H Wallace Jones ^{21/1x-25} states that over one-half the patients dying of heart failure show auricular fibrillation at some time or other before death. The importance of this condition cannot, therefore, be over-emphasized. It is generally accepted at the present time that the dominant factor in the prognosis of heart disease is the condition of the heart-muscle. If the patient is quite unaware at what time the auricular fibrillation set in, it shows, as a rule, that the heart-muscle is fairly good, and the prognosis is much more favorable than if the change was accompanied by severe distress, and evidence of sudden heart failure. In one type of auricular fibrillation, however, the outlook is unsatisfactory, that is, where the heart-rate remains persistently low. In this type there is usually marked myo-

cardial damage. Factors indicating an unfavorable prognosis are limitation of response to effort, cardiac hypertrophy, valvular disease, and failure of fibrillation to respond to digitalis therapy. If the normal rhythm can be restored by quinidine sulphate the outlook is improved considerably, though the tendency of the heart-muscle is to revert to fibrillation. From a comparison of the two main types of fibrillation—the rheumatic type and the senile type—Jones concludes that auricular fibrillation is of more serious significance in the senile than in the rheumatic type. In cases of mitral stenosis the presence of fibrillation makes little difference in the expectation of life. In aortic regurgitation the expectation is better when fibrillation is present than with a normal rhythm. In aortic regurgitation the prognosis is better than in mitral stenosis. With marked cardiac enlargement the outlook is more grave. The expectation of life is longer in females than in males. The electrocardiographic appearances in auricular fibrillation are of two types, the coarse type and the fine type. For typical examples of these types the expectation of life is about the same. The presence of a bizarre *Q R S* complex is of most value in making a guarded prognosis.

Auricular fibrillation has been produced in experimental animals by the injection of histamine, and toxins of numerous types can maintain this condition, when the neural and physical factors alone are insufficient to do so. Those toxins, which are the result of faulty secretion of internal glands, especially the thyroid, and of faulty excretion of the kidney or lungs, or elimination from the bowels, are the most important in the exaggeration of this syndrome. One of the collators has seen numerous examples of fibrillation of several years' standing relieved, when the faults of auto-intoxication and of metabolism described have been eliminated.

Circulation Efficiency—M. B. Cohen, H. S. Applebaum, and E. L. Hainsworth^{10/r-20} report the clinical application of the intradermal salt solution test, as described by McClure and Aldrich, in 1923. When 2 c.c. of normal salt is injected intracutaneously, sixty minutes are required for its absorption in a normal person, when there is renal or cardiac oedema, the speed of absorption is increased in direct ratio to the degree of oedema. The injected salt solution is taken up more rapidly, because the tissues needing the water,

on account of the physics of the œdematous colloids, take it up by a speed which is a direct measure of the extent of their œdema. In conditions of failure of the local circulation, as in gangrene, and local trauma, this condition is delayed, and this test gives a sure one for the decision of amputation in a gangrenous limb or where there is a question of the integrity of circulation in a traumatic injury. In cardiac decompensation the solution will disappear in twenty minutes or less, depending on the degree of the defect. In localized arterial disease those areas which show an absorption in ten minutes or less are involved in the process, and are very close to the zone of gangrene.

HEREDITY

Maud Slye,^{19/v-22} in a discussion of the factor of heredity in cancer, first enters into a consideration of the terms congenital and inherited, with regard to disease. The definition given for the term "congenital," that it presupposes the disease must be contracted *in utero*, as opposed to the transmission of characters through the sperm, or the germ-cells, as is the case with inheritance, opens the old argument along these lines. In all probability the writer does not conceive cancer to be a disease, according to the strict meaning of this word, for in talking of congenital conditions she makes use of the word "contracted," while in speaking of inherited states she uses the term "characters," and the faculty of being passed along by the germ-plasm. Treating cancer as an heritable, recessive characteristic, this writer has developed strains of mice with 100 per cent cancer susceptible inheritance. The claim is made that with pure cancer strain in both parents one generation is all that is necessary to produce this 100 per cent. cancerous stock, just as is the process in the breeding of any recessive characteristic, like albinism. The admission is made that heredity is not absolutely controllable, in that there is in all stock, in spite of its apparent purity, the chance of the occasional throwback. That there is a cancer resistant factor in some members of every species, and that whether cancer be eventually proved to be a specific germ or not, does not alter the situation, since the organic response to every irritation or stimulation differs according to the heredity basis and has an influence on the etiology of the various diseases is claimed. "Similar tissues derived in the course

of evolution from the same ancestry must respond in the same way as the ancestral tissues to the same types of stimulation" Upon this postulate this investigator both accounts for the inheritance of cancer, and indicates that this factor in no way obviates the possibility that cancer may be due to a specific germ

In a résumé of the information at hand of the knowledge of heredity, F A E Crew^{9/viii-14} elaborates mechanical diagrams of the male and female chromosomes, and shows how dominant and recessive characters of the multiplicity and criss-cross nature as observed in *Drosophila melanogaster* can be used to explain many of the variations of the mendelian laws as expressed in man This insect, the fruit-fly, possesses numerous mutations, which behave as most of these characteristics do, as recessives Long wings and gray bodies are dominant over vestigial wings and ebony bodies, and when these four characters are mixed in a breeding experiment, the two dominant attributes combine, so that in the smallest numerical unit possible of computing the offspring of different types, sixteen, nine individuals possess both dominant marks and are long-winged and gray, three show ebony bodies and long wings, three gray bodies and vestigial wings, and only one possesses the two recessive characters, short wings and ebony bodies In addition these insects have two characters, length of leg and red and white eyes, which are criss-cross in their transmission, and are only governed by the mechanics of the *X* and *Y* chromosomes in the formation of the polar bodies, and the *X* and *Y* chances of fertilization. Elaborating on the linear arrangement and variation in the size of the chromomeres, this author interprets the mechanics of this process in a manner which deserves the attention of every physician, if he would avail himself of those essentials of the knowledge of heredity necessary in the practice of medicine

IMMUNIZATION

Good results have been obtained by A Besredka^{26/x-27} in local immunization by means of vaccines Oral administration was made in cases of typhoid, paratyphoid, bacillary dysentery, cholera and colibacillosis In furunculosis, anthrax, felon, mastitis, otitis, syco-sis, impetigo, ozæna, and infectious burns, the administration was cutaneous, or, better still, applied both to the skin and the mucous

membrane In puerperal fever, gauze tampons, drenched with streptococcic filtrate, were used Intravenous injections may be employed in generalized infection In stubborn cases of cystitis and pyelonephritis, instillations of staphylococci auto-filtrates in the bladder, repeated three or four times, were found effective Besredka advises flushing with the anti-virus in every surgical intervention, either before or afterwards, in order to bring about complete immunization of the tissues

INSULIN

The search for the application of insulin to other diseases than diabetes continues On the basis of 42 clinical observations, von Jaksch^{24/ix-17} tells of favorable results obtained from the use of insulin in the treatment of Glénard's disease and of the deleterious action of insulin observed by him in the anæmias and in tuberculosis The total number of units administered varied between 2460 and 3560, and in all instances there was marked increase of weight varying from 10 to 25 pounds, while the appetite and subjective condition improved The author concludes by suggesting that an especially broad and useful field for insulin therapy presents itself in the treatment of liver affections of the most varied nature, in attacking the associated disconcerting symptom of icterus, with its consequences

Combined Oral Administration of Insulin and Saponin—F Lasch and S Brugel^{88/vii-8} have investigated the action of saponins on the alimentary tract, with the result that they have found that these substances increase the absorptive capacity of the gut for certain drugs, among which are digitoxin and strophanthin The same increased intestinal absorption was noted when calcium and grape-sugar were given with saponin When insulin was given in doses of 10 to 20 units combined with chemically pure white saponin, 0.5 gram in saline solution, the two substances being swallowed with a little water, the absorption of insulin was markedly increased Neither of these substances when given alone had any effect on the blood-sugar It was noted that when they were taken in combination, about a half-hour later the blood-sugar began to fall, reaching its lowest point in about three hours, and returning to normal in about seven hours No toxic symptoms occurred in any of the cases The authors believe that this method

of administration will make possible the ideal dosage in insulin therapy, that is, the giving of small quantities at frequent intervals

KALA AZAR

L. E. Napier ^{15 1/x} analyzes 104 cases of this disease treated with stibosan—using 0.3 gram as an average dose, with a total of 4.0 grams to complete a cure. Shortt, Barraud, and Craighead ^{15 1/x} have found a naturally infected sand-fly, *Herpetomonas donovani*, in a heavily infected house with kala-azar, thus showing that it is the transmitting agent of the disease after the monsoon period.

KIDNEYS

Problems in Renal Pathology—Eli Moschcowitz ^{2/1x} analyzes the reasons for confusion in the current classifications of the nephritides, and submits the following classification of the strictly medical nephropathies: (1) Nephroses—(a) chronic parenchymatous nephritis (degeneration), (b) lipoid kidney, (c) amyloid kidney, (d) subacute glomerulonephritis of unknown origin. (2) Glomerulonephritis—acute, subacute and chronic. (3) Arterio-capillary fibrosis (a) with hypertension, (b) without hypertension. The use of the term “nephrosis” has no consistent pathological substratum, and is therefore merely a clinical entity. When the term is used it should always bear a qualification as to what variety of nephrosis is meant. Nephritis, whether acute or chronic, is a disease with a life cycle. The phenomena noted during a certain period of observation are not to be judged as end-results, but as representing a stage of a process, in which clinically the beginning and terminal phases may be quite different, and represent so-called types of the disease. In order to evaluate conditions it is necessary to know what has gone before. Therefore the only proper way to study the problem is by observing cases from beginning to end. This is not a hospital problem, but one for the general practitioner. Anatomic and clinical nephritis are two different things, and one is not to be judged in the terms of the other. Evidence is again brought forward to show the sequential relation of nephritis and arteriosclerosis to hypertension. Nephritis and arteriosclerosis are the same disease and represent contemporaneous reactions to the same insult, namely, hypertension. The term “arterio-capillary fibrosis” is suggested as the term to cover these pathological reactions. In this disease the primary pathologic change

is almost entirely vascular. There is evidence to show that acute glomerular nephritis also represents a generalized capillary disease in which the renal lesion is the localized expression, perhaps the predominant one. There is evidence to indicate that hypertension is the direct result of the increased resistance due to the capillary disease and that the sequential relation of hypertension to nephritis is only specious.

LATHYRISM

This disease is due to the use of millet cultivated on a soil in which manure has not been employed as a fertilizer for some time. An old outbreak at Gilgit is described by R. McCarrison.^{15 1/x}

LIFE INSURANCE

Physical Standards—Major W. R. Dear, of the U. S. Army, in the *Military Surgeon* for October 26, 1926, analyzing the physical examinations of 11,588 officers for the year 1924, points out very clearly the fallacy of close adherence to hard-and-fast rules in regard to the proportion of the usually used standard weight-and-height tables. He claims that the averages for insured male risks do not agree with the same age groups in the officers of the Army on active duty, and that the latter show wider variation between the slender and heavy types. He states that frame and musculature are most important in deciding the question of over-weight or under-weight in the individual, and that in many cases this is of more importance than the tables. The usual tables for this purpose are only to be used as guides, and their weights are not necessarily normal nor optimal for any given individual. Dear finds that 855 officers of the 11,588 are below the averages in Symond's table, and as the height increased, this difference became greater. Quoting insurance authorities, it is developed that young men with thirty pounds less than the average weight for height and age show a mortality 17 per cent higher than their corresponding groups, and middle-aged men of fifty pounds over the average have a death-rate 50 per cent higher. In the upper age groups those with fifty pounds less than the standard showed a death-rate 14 per cent lower than the group with standard weight.

This article shows that over-weight is, therefore, more dangerous in middle life than either in youth or old age. It points out that the groups studied are a selected class, kept in condition by an active

life, examined carefully once a year, and regularly weeded out for any physical defects, and that they represent a better health standard than any other known insured group. The use of the phrase "20 per cent above average" shows a better measure than actual pounds and height in the health-estimation of individuals.

LIVER AND GALL-BLADDER

Double Gall-bladder—Attention has recently been called by Schachner and Nichols^{27/111} to double gall-bladders, about half of which have been discovered at the autopsy and the others either at operation or by means of the X-rays. In Nichols' patient the X-ray examination disclosed two distinct rows of stones in the gall-bladder region, which could not be approximated by manipulation of the gall-bladder. At the time of operation two gall-bladders showing two distinct pouches were removed. When the connective tissue joining them was dissected away, the dissection being carried towards the neck, there were two separate and distinct gall-bladders, each of which had its own cystic duct opening either into a common cystic duct or separately into the common duct. The walls and the mucosa of each of these gall-bladders were thickened and each contained black rough stones the size of a pea, one stone being wedged into the neck of one of the sacs.

Studies on the Effect of Chloroform in the Liver of Rabbits—Edmund de Zalka^{3/111} has made a thorough study of the toxic effects of chloroform, particularly of the delayed poisonings from this chemical. Because of the marked differences between the acute and chronic types of poisoning, he has separated his experiments, so as to study the two lesions singly. The acute changes are well developed at the end of twenty-four hours, and show a marked necrosis in the central two-thirds of the lobules. This necrosis is more marked, and the changes in the neighboring cells are more extensive in rabbits living any length of time past the twenty-four hour period, and in general, the longer the animals lived, the more marked the cellular reaction became. There was an advanced fatty degeneration in zones neighboring the necrotic areas. The chronic lesions are those of cirrhosis, which can be produced fairly constantly in forty-one days. No pathological changes were noted under six hours after the injection. The acute changes were well marked after twenty-four hours.

and up to four and one-half days. The chronic type of poisoning is a periportal cirrhosis. Other authors have carried on similar experiments, especially in animals during pregnancy, and not only find these acute changes in the liver but considerable evidence of endothelial damage in the embryos. Certain workers have noted a condition which simulates hemorrhagic disease of the new-born. In view of the literature on this subject it would indicate that in obstetrics, where chloroform is most largely used, it probably has its most dangerous effects.

MALARIA

The comparative action of stovarsolate and chlorhydrate of quinine in the quartan form of malarial poisoning are reported upon by A. Marie and R. Boyé¹⁷. It was interesting, they say, to see whether arsenic and quinine in association did not exert a stronger influence on the two parasites *Plasmodium malariae* and *præcox*. The products used were composed of oxyaminophenylarsinate, or stovarsolate of quinine, containing 40 per cent. of quinine base. The salt of quinine used as a control was chlorhydrate, with an 82 per cent quinine base. Experiments carried out with patients showed the superiority of the arsenic-quinine. Within three days the number of parasites was reduced 85 to 95 per cent., while it remained practically unchanged under the administration of quinine alone.

MEASLES

Prevention of Measles with Immune Goat Serum—Ruth Tunnicliff and A. L. Hoyne^{19/21-25} produced an anti-bacterial and anti-toxic serum by inoculating goats with green-producing measles diplococci. They found that those individuals who received 4 to 6 c. c. of the serum were protected against measles, if this was administered less than five days after the exposure to the disease. This serum was prophylactic in 45 per cent. of the persons exposed in the four days after contact and in 97 per cent. of those who received it within three days after exposure. All infants under one year of age who received the serum more than four days after exposure developed measles, while 98 per cent. of those exposed were protected where the serum was given within the first four days. The reactions to the foreign serum were noted in 12 per cent. of those

injected The immunity lasted only a few weeks but these authors feel it has a high value in stopping epidemics in infant asylums

MERCUROCHROME

Mercurochrome in the Treatment of Typhoid Fever.—John H Foster and H. A. Chao^{18/xiii} have administered injections of mercurochrome-220, in doses of 5 mg per kilogram of body-weight to two patients with typhoid fever and one with paratyphoid, on the thirty-eighth, eleventh and eighteenth day of the disease In the typhoid cases there was no marked effect on the temperature curve In two cases there was temporary leukocytosis during the chill In all three cases following the injection there was a chill and general malaise and abdominal distress One patient had nausea and vomiting About twenty-four hours after the treatment all three had an intestinal hemorrhage, moderate in one case, but quite severe in the others The first patient had no further complications and was discharged in about two weeks The second patient had a perforation of the intestine but recovered after operation In the third there was continued diarrhoea and the patient died about four weeks later with more hemorrhage These results are quite different from those so far reported for typhoid fever As the symptoms occurred in three consecutive cases, at about the same interval after the injection and in such varying periods in the course of the disease, they seem to have been due to the injections Possibly smaller doses would not have produced such symptoms, though Young declares that severity of the diarrhoea is due to individual variations and is not dependent upon the size of the dose The writers think that intravenous injections of mercurochrome-220 are contra-indicated in typhoid fever and other cases of intestinal ulceration^{19/x-23}

NARCOSAN

"The contradictions that have followed the announcement of 'narcosan' as a cure for drug addiction show the unwisdom of proclaiming any remedy to the public before its value has been definitely established. On the one hand we have two highly reputable physicians and the Commissioner of Correction enthusiastically sponsoring the product Opposed to this is the skepticism of equally prominent doctors and other institutions that have experimented similarly It should be borne in mind that the entire period of the experiments which led to the favorable report in *The New York Medical Journal and Record* is little more than a year, so that even the advocates of the new treatment cannot promise a permanent cure The doubters justify their incredulity by the adverse comments of

the Council on Pharmacy and Chemistry of the A. M. A., the unprepossessing history of the inventor's attempts to exploit his product as a secret formula and, most important of all, by the unfavorable reports of other institutions where 'narcosan' has been employed. Advocates and disbelievers in the efficacy of 'narcosan' as a cure all agree that it has the value of reducing the distress of addicts from whom their drugs have been withdrawn. This is considerable in itself but it is not sufficient to warrant holding out the product as a cure. Under improved controls it might be worth while to continue the experiments. No remedy of any promise should be abandoned until its worthlessness has been definitely proved. In view of the sensational nature of the subject, however, particular care should be taken not to hold out what may prove to be groundless hopes until a mature and uncontroversial decision has been reached."—24/xii-25

PERMANGANATE OF POTASSIUM See under PNEUMONIA

PITUITRIN

Pituitrin Administered at the Beginning of the Third Stage of Labor—During the past three years at the Evanston Hospital, 0.5 c.c. pituitrin has been injected intramuscularly by R. A. Scott^{80/v} at the beginning of the third stage of labor as a routine procedure. In order to estimate the value of this procedure, the records of 1000 consecutive cases in which pituitrin was used were reviewed, and the results compared with 1000 earlier cases in which pituitrin was not used. The tabulated results show that the total number of cases in which manual removal of the placenta was necessary is no greater in the pituitrin series, and that the number of cases of post-partum hemorrhage was only about one-third as many in the pituitrin series. Constriction ring was a less frequent necessity for manual removal of the placenta in the pituitrin than in the control cases, and post-partum hemorrhage, and the need of terminating the third stage of labor, were no more frequent cause for the manual removal of the placenta in the pituitrin than in the non-pituitrin series. The average length of labor in primiparæ in the controls was 15.7 hours, in the pituitrin series 12.9—2.6 hours shorter. In multiparæ in the controls the average length of labor was 9 hours, in the pituitrin series 7 hours—2 hours shorter.

PNEUMONIA

The treatment of acute pneumonia by rectal injection of a weak aqueous solution of potassium permanganate is recommended by H. W. Nott.^{10/vii-17} The solution is prepared by dissolving two grains of the chemically pure permanganate in one and a half pints of water, and three ounces to a pint of the preparation having been made com-

fortably hot is injected by gravity slowly into the rectum. This is repeated every two hours if the patient undergoes treatment late in the disease or by a longer period if the treatment starts early or the patient is unable to retain the injection. When the temperature reaches normal, which is usually by lysis and not by crisis, two injections are given for three days and then one injection for a like period. The advantages claimed for this mode of treatment are that the cough quickly becomes easier, the rusty sputum ceases to be colored, the pulse slows, the respirations become deeper and less shallow, the cyanosis disappears, sleep is secured, the noisy delirium abates, the general appearance of the patient improves, and the duration of the attack is materially shortened. Thyroid is given simultaneously.

Clinical Observations upon the Circulatory Apparatus in Pneumonia—In an analysis of 78 cases of pneumonia F. T. Billings,^{2/vi} of Pittsburgh, shows that this disease must be given an important position for its damaging effect upon the heart-muscle. In a large proportion of cases it is the cause of death. The immediate effect upon the myocardium is profound, while the after-results are not so serious as would be expected from the damage produced during the infection. The amount of damage is best gauged by the autopsy. In the studied series there were 32 deaths, a mortality of 41 per cent. Sixteen were examined after death. It is believed that cardiac damage may be assumed where there is a diminution of the cardiac impulse, a disappearance of the muscle quality of the first sound with marked weakening of the same. Often the second aortic and the second pulmonic sounds are likewise impaired and their intensity diminished. With the weakening of the muscles there is generally a tendency toward lowering of the blood-pressure and quickening of the cardiac rate. Frequently a dilatation of the left or right ventricle is found. Fine moist râles at the base, passive congestion of other organs and cyanosis are added often. The electrocardiogram shows (1) *P-R* interval, (2) abnormal bundle-branch block and other types of intraventricular block, (3) abnormal inversion of the *T* deflection, (4) ventricular change in muscle mass, (5) auricular fibrillation and flutter, (6) marked notching and thickening of *R*. Of eight negative tracings, among the 78, none showed clinical evidence of any heart damage, and all but two died. The slowest conduction

time was 9 24 seconds. There was one auricular flutter in which the auricular beats were 300 per minute, and the ventricular 150.

Electrocardiographic abnormalities are often transient, particularly those occurring in acute diseases and the structural changes in these diseases are often likewise temporary. The author believes that the above-named electrocardiographic changes are evidences of structural heart disease and should be treated as though the myocardium were attacked by the acute disease from which the patient is suffering. Cardiac murmurs were found in three patients, one of whom died. At autopsy a myocarditis was discovered and the muscle-fibres much swollen and obliterated with granular degeneration of the protoplasm. Although a systolic murmur was heard during life, nothing of note was found in the endocardium. This group confirmed observations made by other writers, that the endocardium, though acutely involved, is not severely damaged, the brunt being sustained by the myocardium and the pericardium. Pulmonary œdema was found to be of bad prognostic omen, and is due to failure of cardiac function, especially of the right side. Among a group of 21 with myocardial insufficiency clinical evidence failed in five. No cardiovascular pathology could be discovered clinically or graphically in 23 cases. All but five of these recovered.

In a series of 16 autopsies there were three cases of pericarditis, two associated with pus, and one fibrinous. The series presented four cases of pericardial involvement, constituting 25 per cent, which corresponds closely to results on larger series. There were 31 patients in whom the millimetres of mercury in systolic blood-pressure were definitely less than the pulse-rate. Over half of these patients died, and in all but six a diagnosis of myocarditis was made. Irregularity was mostly of premature beats. Only three cardiac murmurs were discovered. All of the seven patients who developed pulmonary œdema died.

"Death in pneumonia is," Billings states, "in the large majority of cases, one of cardiac failure."

RACHITIS

A. Hottinger^{20/x-29} discusses irradiated cholesterol in the therapeutics of rachitis. Corresponding to the two therapeutic possibilities (cod-liver oil and ultra-violet light), dietary mistakes and unfavor-

able surroundings have been held responsible for the condition. As the author says, however, it seems unsatisfactory to assume two etiologic factors for one and the same disease. The experiments of American investigators (Hess, Steenbock *et al*) regarding the anti-rachitic action in rats of irradiated food are, therefore, of great interest, as they show a direct connection between the dietetic factor and light therapy. Despite undeniable differences, there nevertheless exists, says the author, so great analogy between the rachitis of rats and human beings, that he was led to review the tests of the American investigators and to apply them to human therapy. The most interesting of his conclusions are: Rachitis in children, even under rachitogenous conditions, is cured by irradiated milk (perhaps through the activated cholesterol contained in it). The milk is more effective than cod-liver oil, and nearly as effective as direct irradiation of the child's body. Irradiated cholesterol acts favorably in the case of children under rachitogenous conditions, if given in large doses (2 to 2.5 g daily), in substance or in oil emulsion.

RHEUMATISM

Age Incidence of Rheumatism — J. Ross Snyder^{20/x1} points out a marked difference in the manifestations of rheumatic infection in children and in adults. The same non-pus producing microorganism which causes the marked joint symptoms in the adult displays an affinity for nerve and cardiac tissue in the child. In the child, rheumatic invasion may be so insidious that unless a prefever or prodromal stage be admitted the condition will go unrecognized and the physician will miss a great opportunity in preventive medicine. It is important to recognize that every infant born with a history of rheumatism in the family should be regarded as a suspect and closely watched. Such children are often below par in weight, color and musculature. They are poor feeders, are nervous, restless at night, tossing, gritting their teeth or crying out. They are particularly susceptible to colds. A slight cold, a day of over-excitement or overplay easily causes overfatigue. When these symptoms occur in combination they afford a definite classification of the child as belonging to the rheumatic type. If these prodromal symptoms are not heeded, the child develops more marked symptoms in the form

of a more rapid heart-rate, stiff neck, sore throat and "growing pains" When this stage is reached tonsillectomy and other corrective measures are often disappointing and the heart remains permanently crippled The author thinks that pædiatric literature should be revamped so that it shall no longer teach that rheumatism is rare in children under three years of age The child under this age has just as many portals for the entrance of infection and is even more susceptible than the older child Pædiatrics should teach that the child born of rheumatic parents is a potential cardiac case and should have regular medical inspection.

The Communicability of Rheumatic Disease—Abram Joseph Abeloff and Irwin Philip Sobel^{71/x} have sought information as to the family history of patients who had manifestations of rheumatic infection (chorea, acute rheumatic fever, or rheumatic cardiac disease) and from patients who came to the general out-patient services with conditions other than those due to a rheumatic diathesis. The authors have added their figures to those of previous investigators who have made studies of this question, so that they present a total of 1031 families with an original case of rheumatic infection, of which 475 or 46 per cent had one or more additional cases, while of 677 families with no presenting case of rheumatic infection, only 132 or 19.4 per cent showed any case of rheumatic disease Although it may be acknowledged that the high incidence of rheumatic disease in some families may be due to hereditary and environmental influences, there is much evidence that is suggestive that in many cases the rheumatic affection is transmissible as other infectious diseases The authors therefore urge that the same precautions with reference to isolation and the prevention of transmission be put into effect that are ordinarily employed in other types of infection.

SCARLET FEVER

Epidemiology of Scarletinal Throat Exanthemata—In studying an epidemic of scarlatina in the nursing staff of the Presbyterian Hospital, Franklin A. Stevens and A. R. Dochez^{19/xii-20} observed several cases of pharyngitis, which showed the presence of *Streptococcus scarlatinae*, and which were not accompanied by a rash These cases were similar to the throat infections, which occurred during this epidemic, due to the non-toxin-producing strains

of the *Streptococcus pyogenes*, and had already shown negative skin reactions to the scarlatinal toxin, and were probably immune. Another group in the same series showed protection from this atypical form of scarlet fever by prophylactic doses of scarlatinal antitoxin. They conclude that the same strain of *Streptococcus scarlatinae* can produce clinical scarlet fever or scarlatinal type of sore throat without the other signs of this disease and that these individuals are infectious. Throat infections with this organism can occur in individuals who have previously had scarlet fever.

SEASICKNESS

In view of the prevalence of seasickness among travellers and the doubtful nature of the relief from the various remedies recommended, the success obtained by Weiss,^{24/x-1} of the Woermann Line, with simple oxygen inhalations, is worthy of notice. His experiments were carried out under greatly varying climatic conditions, and were confined mainly to extremely severe cases, where there was apathy and continued vomiting. The necessary apparatus consists of small oxygen tanks (or bottles), with a flexible tube and nickel face-mask. The inhalations were given at half-hour or hour intervals, and were continued for from three to five minutes, with the patient in a position as nearly horizontal as possible. The author does not claim sudden, complete recovery, but in every case there was definite relief from nausea, so that internal remedies were no longer rejected by the stomach. Of these, the author strongly recommends Tinct. Chinæ compos. 10.0, Tinct. Val. æther, spirit. æther, Tinct. Rhei vinos. aa. 5.0, 30 to 40 drops every hour in a swallow of water, with which, he says, he has had brilliant success, following the inhalations.

SKIN WOUNDS

The method of P. Carnot and E. Terris^{18/x-21} of treating skin wounds by means of the extracts of embryos or of regenerated skin has given remarkable results according to this paper. For embryonic extracts they utilize at times the whole powder of young embryos, immediately dried by pulverization with phosphate or sulphate of anhydrous soda, at other times their glycerinated extract, or the extracts of embryonic skins of older fetuses. For skin in active

proliferation, the following technic is employed, which has the advantage of not destroying the animals made use of. On the skin of the back of a rabbit, previously shaven, a large number of superficial wounds are made by means of a bistouri or scarifier. After about ten days, the scarified skin is resected, and the edges sutured. The skin thus resected is cut into fine pieces, dehydrated by phosphate of anhydrous soda, and used thus, or the glycerinated or acetic extract recovered by water or by grease is applied as a dressing or incorporated in an agar jelly on the wounds or lesions of which it is desired to stimulate the cicatrization. In this manner, the authors say they have successfully treated large atonic wounds in human beings, with almost immediate resumption of epidermization. One case reported was that of a trophic ulcer which had developed on an old scar from a burn and which had resisted all other treatments. Complete cure was achieved within four weeks.

SODOKU

The Use of Sodoku in the Treatment of General Paralysis—H. C. Solomon, A. Berk, M. Theiler and C. L. Clay^{6/ix-15} present a preliminary report on a method of treatment in general paralysis which they believe will result in an improvement on the malarial method of Jauregg. Sodoku, a disease fairly well known in Japan, has been occasionally recognized in the United States and most other countries. A number of the symptoms of the disease are suggestive of syphilis—a sore somewhat like a chancre, a regional lymphadenitis, and the subsequent signs of a generalized spirochætosis. The infection is transmitted by the bite of a rat or several other animals infected with the spirochæte. After fever lasting from five to twelve days, skin lesions appear quite similar to those of the secondary period of syphilis. The advantage of the method is that the infection can be maintained in laboratory animals, and is thus always available for use, which obviates the necessity of transmitting human blood, or of having on hand a case of human infection. Furthermore, the disease is less debilitating to the paralytic patient than malaria, and it can be given to patients who are more or less immune to malaria. There is no objection to using it with malarial therapy. Sodoku can be transferred to man by either intradermal, or intravenous inoculation of blood from an infected animal. The intraven-

ous method seems preferable because it avoids the formation of the primary lesion and lymphangitis. The usual dose is 1 c.c. intradermally or 0.1 c.c. intravenously. The artificially produced disease is quite similar to the naturally acquired disease, and is readily controlled by arsphenamin in 0.3-gram doses. A sufficient clinical and serological improvement has been noted in some of the patients treated by this method to suggest that the therapeutic value of sodoku is equal to that of malaria. Even with apparently equal results of the method with other infectious means of treating general paralysis, this one because of the closeness of its organism to the spirochæte should be perfected.

SPORT

Of practical interest to many, if not all physicians, is the exhaustive article by Rudolf Ackermann ^{24/x-22} on the "Influence of Sport on the Heart." After quoting a number of pre-war articles, which still contain, it is true, much that is authoritative, the author declares that the war taught us that the human heart can withstand much greater strain, without injury, than was previously believed by physicians. Certain clinical heart symptoms, such as impurity of tone, murmurs, were at that time regarded as signs of an injured heart, as due weight was not given to the really decisive question whether the intrinsic strength of the heart was impaired. Investigations show that the weight of the heart, and in consequence its size, is closely connected with the work which it accomplishes. Autopsy findings, however, notably those of Hirsch, argue against the existence of hypertrophy of the heart due to "work," while animal experiments furnish no convincing evidence on this point. The question is complicated by the fact that authorities do not agree as to whether the clinically enlarged hearts of athletes are to be regarded as hypertrophied. Without attempting to settle this question, the author discusses the subject from the practical standpoint of the physician's responsibility in individual cases, especially where certain weaknesses, such as valvular leakage or aortic insufficiency, as in the case of the present German ski champion, are in evidence. "Although mild athletic activity may be permitted those with aortic insufficiency, if there is no marked hypertrophy, the greatest caution

must be urged in cases of mitral insufficiency, and especially mitral stenosis "

STIBOSAN See under KALA-AZAR

SYPHILIS See also SODOKU (Rat-bite Fever)

An immense amount of work has been done and is being carried forward in the study of syphilis and of the many problems connected with this disease. There is growing opposition to the indiscriminate, "schematized" treatment of all cases with arsphenamine, irrespective of constitutional peculiarities and the danger of involvement of the central nervous system. Like tuberculosis, the disease is receiving more and more attention from the individualistic standpoint. To this end, modified methods in the administration of salvarsan are being sought. The same holds true as regards the Wassermann blood-test, although here it may be said that it is rather a substitute which is the desideratum in view. Prophylaxis, likewise, is constantly receiving increased attention, especially as regards the arousing of public attention in this highly important phase of the subject. *L'Indépendance Médicale*, which is published in French in Canada, in its issue of October 15th, calls approving attention to the educative work that is being accomplished along these lines by the U S Public Health Service. It is no longer open to dispute, remarks the journal in question, whether prophylaxis is effective, the only point at issue is the manner of application. Similarly, Herbert Stranz (*Beirheft zur medizinischen Klinik*, No 2) discusses prophylaxis, together with the treatment of venereal diseases in general. "Syphilis," he remarks, "has ceased to be a skin disease, therefore, as Pinkus observed, every physician must be a syphilographer."

Malaria Treatment of Syphilis—F Bering^{24/xi-26} discusses the indications for malaria treatment of early syphilis. Without entering into the technical points regarding examination of fluid and interpretation of same, the author's conclusions may be given. (1) The fluid of every syphilitic must be most carefully examined when the treatment has been completed (about two years after infection). (2) Every positive finding—slight in the second stage, stronger in that of latency—indicates a serious prognosis for the future. (3) A systematic salvarsan-mercury or bismuth-mercury treatment is imperatively called for, owing to its action on the diseased fluid.

(4) The combined bismuth-malaria-salvarsan treatment is far superior in its results to all others (5) Positive fluid findings are an indication for the malarial treatment (6) With careful oversight of patient, the malarial treatment presents no danger

Neo-mesarka — This is a new Swiss derivative of arsenobenzol compound, containing about 20 per cent arsenic, and is highly soluble in cold water Steinmetz ^{28/x1} related his experiences with more than 1000 injections in over 50 cases In general, the results were the same as with neo-salvarsan, although tolerance seemed somewhat greater Two accidents occurred, both referable to the patient's hypersensibility to arsenic Numerous case reports are given

Opacification and Micro-reaction — After discussing the numerous methods which have been offered as substitutes for that of Wassermann, and claiming that none of them is entirely reliable, Ernst Meinicke ^{4/x} presents two methods of his own, to which he gives the names "reaction of opacification" and "micro-reaction," respectively The former is macroscopic, the latter microscopic For both he claims simplicity of application, sensibility and specificity, quoting widely from the opinions of other investigators in endorsement Full instructions are given in the article for the use of his two methods Interesting is his statement that in a series of studies carried out by him, in conjunction with Koster and Amend, in a sanatorium for tuberculous patients, only one-third of the syphilitics in the institution were suspected of the disease, while the other two-thirds were discovered only by systematic blood examinations The time is not far distant in Germany, he says, when no patient on entering a hospital will be exempt from serologic examination

The Use of Calcium Preliminary to Arsenobenzol Injections — Further investigations by Schumacher and Liese ^{23/vi-18} confirmed their previous observations that intravenous injections of calcium salts by the mouth, prior to the injection of neo-salvarsan or when injected in conjunction with the injection of salvarsan, will markedly aid in preventing the toxic effects of the arsenic contained in these widely used anti-syphilitics These toxic effects, it is pointed out in the paper, are due to the excessive combination of salvarsan or neo-salvarsan with the cellular protoplasm in the absence of a sufficient amount of calcium salts circulating in the blood-stream The experimental work of these authors shows that calcium chloride dis-

solved in distilled water or Ringer's solution is efficacious in the prevention of such combinations when arsenobenzol is present in the patient's serum. In the opinion of Schumacher and Liese the favorable action is due to the formation of colloid solutions of sodium nucleinate and gelatine from the contained proteins of the serum. There is some evidence to show that strontium salts are even better in preventing toxic effects from arsenic when injected intravenously than those of calcium.

The Kahn Test—J E Houghton, Oscar B Hunter and Tomas Cajigas,^{19/xii-4} of Washington, discuss the relative values of the Kahn and Wassermann tests, and indicate that the Kahn test is more scientific, less dependent upon technical limitations of procedure, is simple, direct, and rapid, and offers opportunity of a report in a very few hours. Its greater availability in tropics, isolated stations, and in fact anywhere where extensive laboratory facilities are unavailable gives it a great advantage over the Wassermann reaction. They claim that it is more sensitive than the Wassermann test in treated cases and in the primary stage of the disease, and slightly more sensitive in all the other stages of this infection.

TETANY

Infantile Tetany—John P Scott and Saul J Usher^{10/xii-4} have made a fairly extensive study of the disorders of calcium metabolism in infantile tetany, and conclude that difficulties of metabolism of this element are not always revealed by changes in the blood-stream, and that there can be defective utilization of calcium in spite of the normal blood content of this substance. They found that calcium chloride and ammonium chloride were specific in relieving convulsions of infantile tetany and that the symptoms returned when these chemicals were discontinued. They also find that cod-liver oil in large doses, when combined with the calcium medication, slowly and permanently raises the blood-calcium to normal and that ultra-violet treatment was the most reliable in relieving this condition. They did not find that inorganic phosphorus was decreased or increased in this condition.

THORIUM

Death from—P E Weil and A. Lacassagne^{10 i/iii-3-'25} report the case of an engineer, aged forty, who, after having worked for years with radium, began in 1920 to make therapeutic preparations with

radio-active substances of the thorium series In July, 1924, he began to manifest symptoms of progressive pernicious anæmia, which terminated fatally in January, 1925 There was a hemorrhagic tendency which, in spite of blood transfusions, persisted until death without amelioration The blood-picture was typical of pernicious anæmia There were no microscopic changes and no nucleated red cells The bleeding time was prolonged to one-half hour and the coagulation time to twelve minutes without retraction of the clot At autopsy the spleen was found to be exceedingly poor in cellular elements The case is reported because it shows that thorium as well as radium and the X-rays can cause a progressive aplastic pernicious anæmia Similar results, after exposure to thorium, have been noted in experimental animals

THROMBO ANGIITIS OBLITERANS

S Silbert,^{19/vi-5} in a report of 2500 intravenous injections of hypertonic salt solution, in 66 cases of this condition reports very favorable results Using a 5 per cent solution, prepared with freshly distilled water, and employing 150 c.c. for the first injection, and 300 c.c. for the subsequent ones, this procedure is repeated three times a week, for a while, then twice a week, till improvement results, when the treatment is tapered off slowly till a maximum benefit is reached Improvement may be noticed at once, but frequently a few weeks elapse before there is any change for the better The first signs of improvement are a sensation of warmth in the affected limb and some diminution in the pain, the temperature of the part then improves, the nails resume their growth, and the trophic ulcers begin to heal Later the occluded vessels begin to pulsate, and the other usual signs of a restored circulation appear The healing of the ulcers are the most important constant sign, and some of these cases were treated for eight or nine months Where the treatment has failed, and amputation has been necessary, chiefly in those cases in which the process was already advanced, the condition of the limbs were so improved as to allow of a below-the-knee operation with normal healing of flaps and good stumps, a condition not usual in these cases

Further weighty evidence is furnished by R. W. McNeely^{19/vi-26} to lead away from the surgical procedures of periarterial sympathectomy, and toward the operations of ramisection, and section of

posterior ganglia This paper, carrying a most complete bibliography, proceeds along the logics of physiology and anatomy, in a complaint against the use of this procedure, and in addition points out the numerous serious accidents that can occur in this rather difficult technical operation, while the latter operations are defended as less difficult, and are attended by none of the serious sequelæ.

THYROIDIS

The Injection of Absolute Alcohol into the Thyroid Gland—Howard B Barker ^{6 1/vIII-25} points out that although injection therapy of the thyroid has been used since 1867, and though various substances had been used (iodine, boiling water, urea, quinine sulphate, phenol, glycerin, etc), there are no histopathologic reports of the gland after injection until 1895, when Prinz concluded that the chief local effect of the tincture of iodine was due to the alcohol. The success that attends the use of absolute alcohol injection in the prevention of amputation neuromas led Huber (*Arch Surg*, 1 85, July, 1920) to suggest the use of absolute alcohol for thyroid injection. This method seemed to the author deserving of experimental study It was found that the microscopic picture produced by the injection of absolute alcohol into the thyroid gland is that of a coagulation necrosis in the area injected—the amount of necrosis being in direct proportion to the quantity of alcohol injected This destruction is followed by round-cell infiltration and very marked fibroblastic proliferation and infiltration. The colloid, after being acted on by the alcohol, acts as a foreign body, giving an even more active fibroblastic proliferation. Foreign-body giant cells can be seen about bits of colloid in the older preparations The ultimate picture is one of fibroid tissue replacement of the destroyed thyroid tissue There was no immediate or delayed general effect from the alcohol in these experiments Ten c.c. was the largest quantity used at one sitting, but this is probably as large a quantity as would be required for a single injection in a human being From experimental results obtained by Hyatt and others, it is not to be expected that the quantity of alcohol necessary for thyroid injection purposes would have any effect on pulse, respiration or blood-pressure The ease with which alcohol can be injected and the harmlessness of the procedure suggests the use of this solution for the destruction of thyroid gland tissue as a preliminary preparatory measure The process of destruction resembles that

produced by the injection of boiling water but is accomplished without the inconveniences and without special apparatus. The author's experiments warrant the conclusion that the injection of absolute alcohol in suitable quantity in cases of thyroid disease in which the use of boiling water has been suggested and used, is a safe and legitimate method and is recommended as an operative procedure in thyroid surgery.

TUBERCULOSIS

The vexed question as to whether tuberculosis of the human organism is to be regarded as a problem of infection or of the individual constitution, is interestingly discussed by Strahlmann^{14/xii-7}. The author's conviction is that in tuberculosis we are dealing with a metabolic disturbance which has usually existed for years, generally as the result of mistaken nourishment (acidosis), to overcome which, he believes with Andersen, is the primary object of treatment, only on this basis can the infection arise and spread. Cennan's views are quoted with approval. Schmidt^{14/x-9} is inclined to rate the constitutional factor even higher than that of infection. Pfalz^{23/vii-9} discusses the marked influence on the blood-picture of treatment with silicic acid. Zicker^{14/iii-14} shows the favorable effect on the rapidity of blood gravitation caused by injections with Tebarsil (calcium-silicium). "There is no doubt in my mind," says Strahlmann, "that calcium-silicium therapy in tuberculosis, especially in ambulatory treatment, will quickly establish itself, since it is effective, simple and without danger in administration, which cannot be said for many other new methods." G. Marcialis^{15/xi-7} likewise discusses the constitutional factor in tuberculosis, and stresses its importance.

Pulmonary Tuberculosis—H. Kraus^{33/viii-28} gives an interesting account of his experiences for twenty years with phthisis. Tuberculin, he finds, is the only remedy with sustaining action. Ponndorf is too dangerous, while chemotherapy and almost all pharmaceutical preparations are without effect. Hygienic-dietetic treatment is, of course, a chief reliance in institutions, whereas hydrotherapy is less and less used, and irradiation only cautiously, although the value of roentgen diagnosis is pointed out. Collapse therapy of various forms, when skilfully employed, he regards as valuable. Phrenic operations are effective only with pneumothorax or a plastic operation.

BCG Vaccination.—Tsekhnovitzer^{4/x} gives the results of a study of anti-tuberculous vaccination with BCG. Experiments were made with guinea-pigs, rabbits, calves and colts. In none of the guinea-pigs which died from intercurrent diseases, or which were sacrificed, were there macroscopic signs of TB. Following inoculation of 100 to 200 g of bacilli, lesions were observed in the form of encysted abscesses containing acid-resisting bacilli and having the histological structure of tuberculous granulomas. The contents of these granulomas injected under the skin or into the peritoneum did not give rise to tuberculous lesions. Facts of approximately the same sort were observed in the case of the other animals. Similar vaccination of human beings was carried out with 329 children, of whom 50 were from tuberculous families. Growth during the period of observation (6 to 7 months) was normal. None of the children died from TB, although seven died from intercurrent diseases.

Renal Infection in Pulmonary Tuberculosis.—Edgar M. Medlar,^{8/x} making complete serial sections of whole kidneys from individuals suffering from advanced pulmonary tuberculosis, demonstrated renal tuberculosis in twenty-two out of thirty autopsied cases. He concludes that the infection is hematogenous in origin, 75 per cent of the lesions being found in the cortex, and finds that the infection is usually bilateral. The most important finding in the investigation was the clear-cut evidence that these lesions heal, and scars were found in seventeen out of thirty cases. The second most important fact was that none of the cases showed clinical manifestations indicative of renal infection, and apparently for this reason the urine had never been tested for the presence of tubercle bacilli.

Tuberculosis in the Filipinos.—Majors G. R. Callender and M. W. Hall^{2 1/xii-25} present a study of tuberculosis in the Filipino. These studies comprise a complete review of the existing literature on this subject, an analysis of 10,000 autopsies, and a survey of Filipino and American troops which included chest examinations by a corps of experts, correlated by X-ray photographs in the doubtful cases.

These authors divide the disease into three anatomical forms, first, the primary tuberculosis, seen only in children of a population which has been tuberculized, who have received an overdose of the organism, before they have been exposed to the smaller doses which

usually lead to immunity. This type also appears in virgin races when they are brought into contact with a tuberculized race, if the first contact doses are large enough. This form of the disease is a rapid one, and has been a veritable scourge in tropical islands chosen as tuberculosis health resorts, because of their freedom from this disease upon their discovery. This is the so-called "acute" form of the disease. The second type occurs in individuals who have developed a low-grade immunity and exists as a generalized infection of the lymph-nodes, with extension to the viscera, bones, peritoneum and meninges. The third type is the usual picture seen in tuberculized races, in which the individual has been gradually exposed to the bacillus, and has developed a certain amount of immunity, before the infecting dose, or the mechanical accidents in the progress of the immunizing infection, have placed him in the category of true infection, and out of the realm of tuberculous vaccination or immunization. This is the usual chronic form of the disease with fibrosis, cavitation, and periods of inactivity, seen in tuberculized races. The proportion of the third type of the disease indicates the amount of tuberculization of a population, while a high percentage of type one indicates one which has not been exposed to the disease, and has developed little or no immunity. The appearance of a high percentage of the second type of the disease or a high mortality from tuberculosis among children, in a population showing a high degree of tuberculization by the large numbers of the third type of the disease, indicates poor hygiene and a lack of the use of the known preventive measures. The increase in the rate of tuberculosis which accompanied the influenza epidemic of 1918 in all civilized countries, and was followed by a considerable fall, was reversed in the Philippines, a fall in the rate appearing during the epidemic, followed by a distinct rise. No satisfactory explanation of this difference could be found. The incidence of chronic tuberculosis in the Philippines indicates this country to be highly tuberculized, while the disproportionately high incidence of the lymph-node and abdominal tuberculosis indicates a failure of hygienic and preventive measures against the disease. The analyses of the different data available indicate this same finding in every instance, and warrant the following conclusions. The incidence of tuberculosis in Filipinos is two and one-half times as high as in Americans. The morbidity and mortality rates in the

upper age groups are higher than in the white and colored populations in the United States. The tendency of the tuberculosis mortality of the Filipinos is upward and although this may be partially accounted for by better diagnosis, the bulk of this increase, as well as the higher rate than in other countries, must be attributed to failure of preventive measures and poorer hygiene and sanitation.

TUTOCAINE

Siedner^{24/1x-7} gives a short, but suggestive, summary of the use of tutocaine in anæsthetizing the urethra of 400 male patients. The drug was well tolerated, both by the old and the young, and the anæsthesia was always found to be sufficient for cystoscopy, catheter examinations, and other customary interventions. Injections were made with the ordinary urethral syringe, the dose varying from 8 to 10 c.c., of a $\frac{1}{4}$ per cent solution which is allowed to remain for from ten to fifteen minutes in the urethra previous to examination. Before each injection of the solution of tutocaine, which is quite stable, the author adds 3 to 5 drops of a 1 per cent adrenalin solution.

UROTROPIN

Laemmle^{83 1/xi-'25} recalls that in the year 1921, Vogt found that the intravenous injection of urotropin was useful in combating post-operative urinary retention. He gave the urotropin in injections of 5 c.c. of a 40 per cent solution. Pasch found that injections of urotropin were effective, while injections of saline were without effect, this he thought showed that the results could not be attributed to a psychic factor. With this view the author disagrees. He reports several cases in which patients required catheterization for considerable periods (in one case for sixteen days) after various gynæcological operations, and yet after the injection of saline solution they were able to urinate spontaneously. From evidence of this nature he claims that the psychic factor does enter into the results claimed for the intravenous injection of hexamethylenamine in post-operative retention.

URTICARIA

Wheal Formation in Infants and in Children.—Wheal formations in œdema, cretinism, sclerœdema, sclerema, nephritis, cardiac disease, severe prostration and in tuberculin-positive subjects are stated by J. D. Pilcher^{1/1} to be due to increased permeability of

the walls of the vessels of the skin in the presence of adequate circulation. Adequate circulation is necessary for wheal production. It was observed that wheal formation is modified in a measurable degree in cardiac œdema, and this knowledge led to investigations in the above named diseases. Normal children were used for control. Codeine was the drug employed for the wheal production. It was found that the skin towards the wrists reacted with wheals to codeine much less than near the elbow. Wheal formation is lessened in certain ill-defined skin infiltrations. In nephritis without œdema wheal formation, and hence the vessel permeability, is normal. In valvular and congenital heart disease without œdema it is normal, which indicates an efficient circulation in the skin. In myocardial degeneration and in certain cases of severe prostration, wheal formation is diminished because the cutaneous circulation is lessened. In all cases of œdema, regardless of cause, wheal formation was lessened.

VACCINES

The Local Administration of Bacterial Vaccines in the Treatment of Subacute and Chronic Nasal Sinus Conditions—Harold Hays^{22/21} confirms his statements made before the Laryngological Section of the American Medical Association in May, 1925, as to the satisfactory results obtained by vaccines locally applied in the treatment of various nose, throat, and ear affections. The present article deals chiefly with sinus conditions. It is seldom that an infection is isolated and confined to one sinus only, and frequently several different species of microorganisms are involved. So instead of isolating and regrowing the bacteria, which overgrow others in the cultures and which may or may not be at fault, use is made of all the bacteria and their extracts obtained from cultures from the diseased parts. The plan of treatment which Hays recommends includes a complete examination, including transillumination and X-ray examination. The vaccines are applied after the parts are thoroughly cleansed. The cultures should be planted immediately in sugar bouillon, as delay may mean overgrowth of the non-infecting organisms. The vaccine is usually applied in eight treatments at intervals of three or four days each, and in the interim the patient uses a spray of the vaccine twice daily. The method of applying the broth-vaccine consists in placing it on long strips of cotton or 1/2-inch gauze, pack-

ing this in the nares and allowing it to remain for twenty minutes to one-half hour. The nose is then sprayed with a mild antiseptic oil. Usually, in about the fourth week, a decided improvement is noted by this mode of treatment.

VARICOSE VEINS

The Treatment of Varicose Veins by Injection.—The fact that there is great need for a non-surgical treatment of varicose veins, as demonstrated by the increasing number of quack remedies in the lay press, led A. J. Douthwaite^{9/ix-25} to experiment with the production of thrombosis in varicose veins, following the method of Genevrier. He used a solution of quinine hydrochlorate 4 grams, urethane 2 grams and distilled water 30 c c. A pneumatic tourniquet is applied with moderate pressure above the portion of the vein to be dealt with and 0.25 c c of the solution is injected into the lumen through a fine hypodermic needle. A few minims may be introduced outside the vein, but this is not usually necessary. The puncture opening is sealed with collodion, which may be removed the same night, and the injection repeated about two inches farther up the vein. Where the varix is large the same area may have to be injected two or three times. As a rule, however, one injection is sufficient for each two or three inches of vein treated and apparently the large size of veins is no contra-indication for this procedure. In 88 unselected cases of varicose veins treated by this method the results were uniformly satisfactory, and no recurrences were reported up to the time of writing. In a series of over 1000 injections no embolic disturbance was noted. The thrombosis formed in this way seems to be firm and adherent.

VITAMINS

From an experiment in feeding with white rats, aimed at an evaluation of the nutritive value of the usual foods known to contain vitamins, in comparison with others of a known low value to which has been added preservatives as formalin and sulphurous acid, R. McCarrison^{9/x-23} concludes that they cause stunting of growth, physical inefficiency, and disease, causing pulmonary and gastro-intestinal diseases, so frequently found in civilized peoples. He discovered epithelial overgrowth in the mucosa of the stomach, atony of the intestinal muscles as well in the mucosa, and a more frequent

liability to respiratory infections The growths in the mucosa of the stomach are described as villiform and mammiform, and histologically were papillomatous outgrowths of the stratified epithelium in the proximal part of the stomach Though drawing no conclusion from this unequal comparison of a low vitamin diet which contains food preservatives, with a well-recognized high vitamin one the writers feel that these chemicals reduce the nutritive value of foods, and should have been placed in the high vitamin foods and omitted from the others if the experiments were carried out to a logical conclusion

In his experiments on grown albino rats on diets calculated to test the effect of fats and vitamins, L B Lange^{21/7-25} made inoculations with heavy doses of bovine tubercle bacilli The course of the infection was followed, as evidenced by tissue reaction, the presence of tubercle bacilli and the change in weight The course was essentially the same in the control and test diet groups, with the single exception of a group on a diet high in fat and deficient in vitamins, which showed an earlier complete elimination of the tubercle bacilli Previous observations regarding the staining properties of tubercle bacilli in rat tissues were confirmed, in that it was found that they were stained by the Gram-Weigert stain in more cases than by the Ziehl-Nielsen, and that when they were demonstrable in the same case by both methods, the Gram stain revealed them in far greater numbers

H. M. M. Mackay and H. F. Shaw^{21/1-21} produced rapid healing of rachitic lesions in children, by feeding them dried milk which had been exposed to the vacuum mercury arc ultra-violet light They used a 140-voltage lamp for one hour The exposure had no effect on white flour, and not much on cotton-seed oil The anti-rachitic property of the dried milk withstands ten minutes' boiling

WHOOPING COUGH

Tetany as a Cause of Convulsions in Whooping Cough—A consideration of the nervous complications of whooping cough shows, as Grover F. Powers points out,^{1/x1-25} that they have generally been attributed to asphyxia, central œdema or congestion, brain injury from hemorrhage, encephalitis or meningitis The outstanding symptom of all these conditions is convulsions, and the rarity with which definite pathologic conditions are proved to exist is in striking con-

trast to the frequency with which convulsions occur. It is quite probable that the principal basis upon which the diagnosis of cerebral hemorrhage, encephalitis or other lesion has been set up is the existing convulsions in whooping cough due to tetany, and not to anatomic injuries or an unknown toxin.

WOUNDS

The Sterilization of Infected Wounds and Chronic Ulcerations by Periarterial Sympathectomy—René Leriche and R. Fontaine,^{20/1x-4} of Strasbourg, have found that in chronic ulceration following burns, varicose ulcers, syphilitic ulcers, chronic post-traumatic ulcers, etc., periarterial sympathectomy is followed in from five to thirteen days by absolute sterilization of the chronically infected area, provided the wound does not communicate with a focus of osteomyelitis nor contain a foreign body. This treatment is, of course, only applied after adequate anti-syphilitic treatment where there is any question of this infection. The investigations of these writers have shown that these ulcers are always infected with a large variety of bacteria. The various dressings that are usually done in these cases do not alter this bacterial flora, and arsenobenzol and insulin, even though they may promote healing, do not modify the infective status of the wound. The rapid sterilization that takes place is due to an exaltation of the tissue vitality promoting a speed of healing in these infected wounds which exceeds that observed in normal sterile ones. This increase in the tissue vitality is indicated in the daily study of the smears of the wounds, which shows an improvement of the circulation with an increase of young active polymorphonuclears, large mononuclears, and numerous red cells in the exudate. This relief of the turgescence of these wounds is also evidenced in their gross appearance, which encourages the employment of skin grafts, a high percentage of which now take readily, further impeding the factors which produce the vicious circle of chronic ulceration.

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